April 1941

TECHNOLOGY REVIEW

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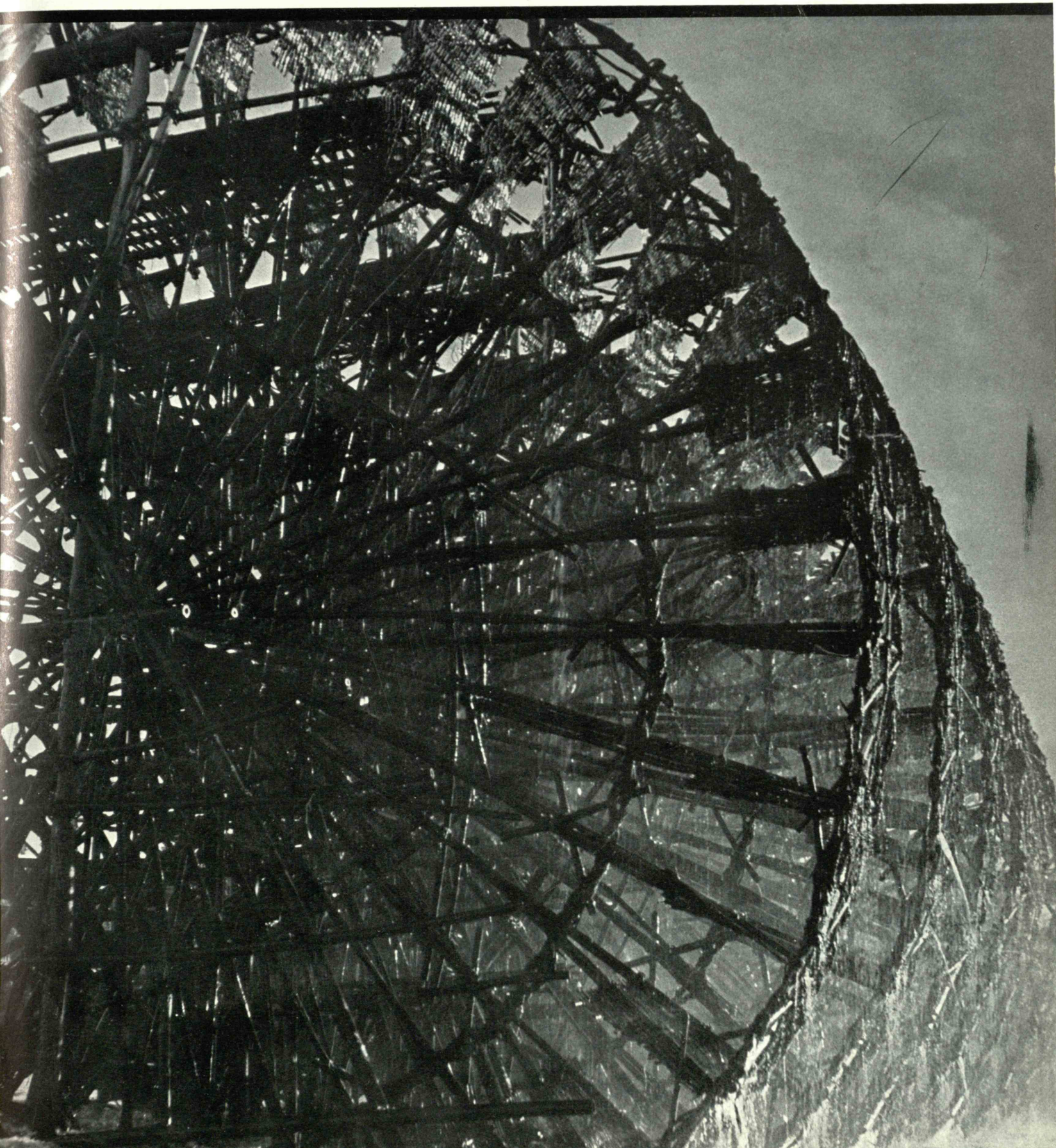

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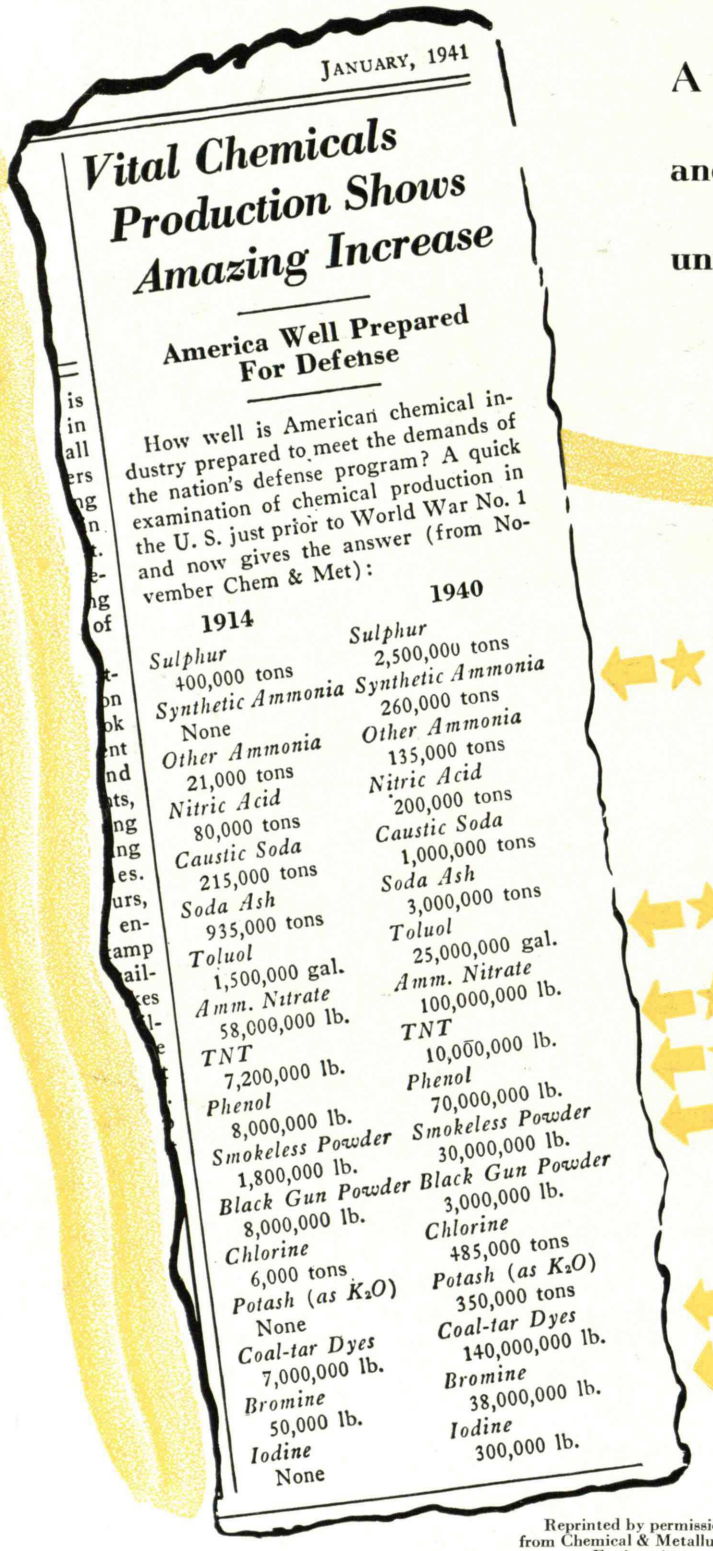
BADGER



JANUARY, 1941

Vital Chemicals Production Shows Amazing Increase

America Well Prepared For Defense

How well is American chemical industry prepared to meet the demands of the nation's defense program? A quick examination of chemical production in the U. S. just prior to World War No. 1 and now gives the answer (from November Chem & Met):

1914	1940
Sulphur 400,000 tons	*Sulphur* 2,500,000 tons
Synthetic Ammonia None	*Synthetic Ammonia* 260,000 tons
Other Ammonia 21,000 tons	*Other Ammonia* 135,000 tons
Nitric Acid 80,000 tons	*Nitric Acid* 200,000 tons
Caustic Soda 215,000 tons	*Caustic Soda* 1,000,000 tons
Soda Ash 935,000 tons	*Soda Ash* 3,000,000 tons
Toluol 1,500,000 gal.	*Toluol* 25,000,000 gal.
Amm. Nitrate 58,000,000 lb.	*Amm. Nitrate* 100,000,000 lb.
TNT 7,200,000 lb.	*TNT* 10,000,000 lb.
Phenol 8,000,000 lb.	*Phenol* 70,000,000 lb.
Smokeless Powder 1,800,000 lb.	*Smokeless Powder* 30,000,000 lb.
Black Gun Powder 8,000,000 lb.	*Black Gun Powder* 3,000,000 lb.
Chlorine 6,000 tons	*Chlorine* 485,000 tons
Potash (as K_2O) None	*Potash (as K_2O)* 350,000 tons
Coal-tar Dyes 7,000,000 lb.	*Coal-tar Dyes* 140,000,000 lb.
Bromine 50,000 lb.	*Bromine* 38,000,000 lb.
Iodine None	*Iodine* 300,000 lb.

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A name long identified with the design and construction of complete plants and units producing many of our essential chemicals

ONE CONTRACT UNDIVIDED RESPONSIBILITY

Badger Units and Complete Plants have played an important part not only in the tonnage of chemicals produced in the year 1914, but in the startling increase in tonnage since then.

All of Which Implies extensive experience in plant design for the production of chemicals. Coupled with this is experience gained by work in other divisions of the processing industry.

Badger Services are available to any extent—economic studies, research, design, process, equipment for part of plant or a complete plant operating to meet guarantees.

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THE TECHNOLOGY REVIEW, April, 1941. Vol. XLIII, No. 6. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and Foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

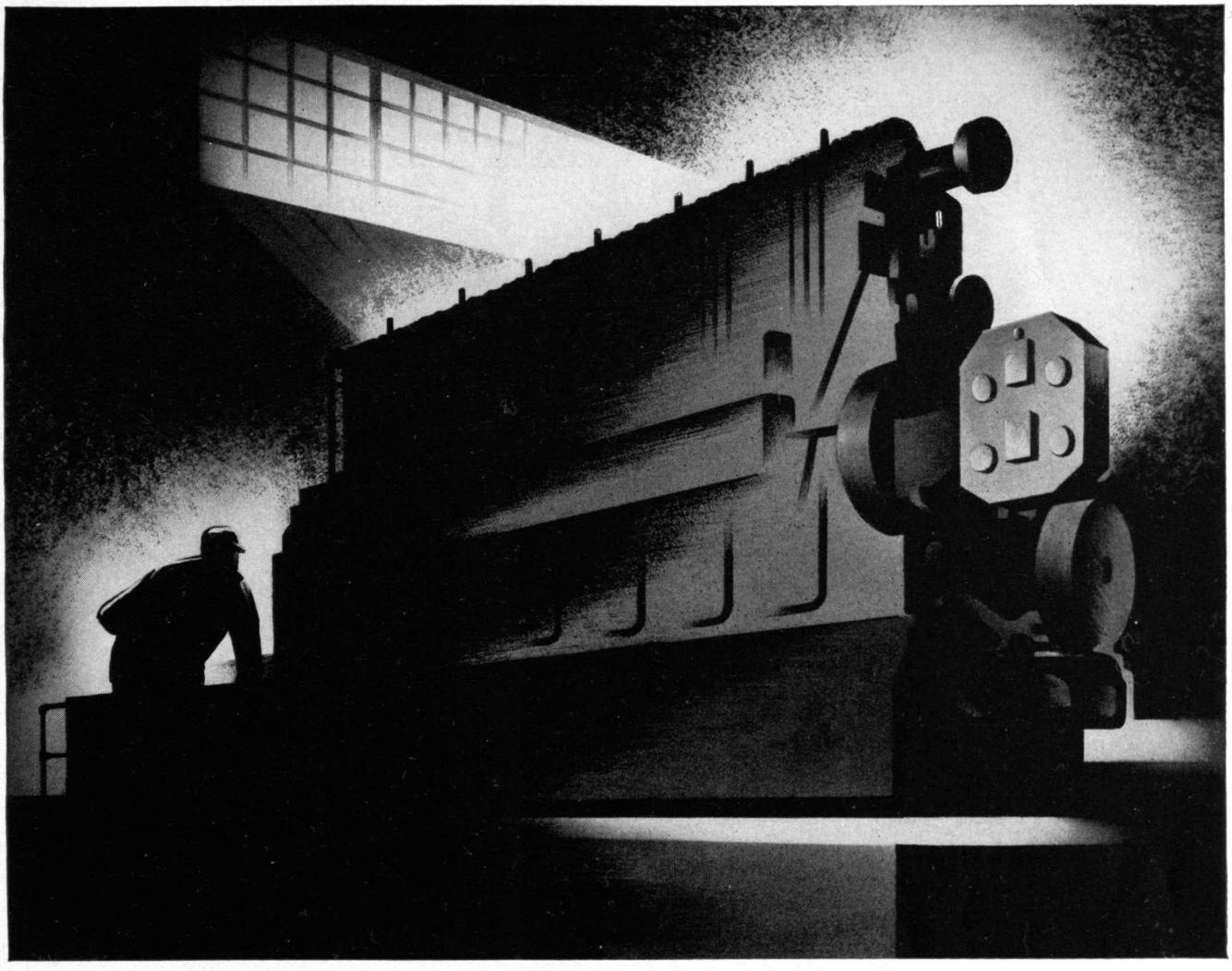
THE TABULAR VIEW

Isentropic. — As the air becomes more and more the front line of war, knowledge of air fronts in meteorological terms has become of greater and greater military value. Long-range weather forecasting may hence be a useful by-product of the present struggle, and thus again the stimulation of meteorological knowledge by martial demands will have been demonstrated. The relationship between war and weather is sketched in this issue of The Review (page 247) by SVERRE PETTERSSEN, Professor of Meteorology in charge of work in the subject at the Institute. Dr. Petterssen's explanation of advanced methods of air-mass analysis has the authority of his distinguished career as one of the group of Scandinavian students of the weather upon whose work modern technique is based. Before coming to Technology in 1939 to take charge of meteorological research, Dr. Petterssen headed for seven years the Forecasting Institute in Bergen, Norway.

Unlike Likes. — Talk being so familiar a phenomenon, the interest which men take in analysis of it is the more readily understandable. Chief difficulty with many discussions of the ubiquitous subject, however, is that such discussions offer little which is basically new. The penetrating essays which BENJAMIN LEE WHORF, '18, has earlier contributed to The Review have rightly been regarded as exceptional by readers, some of whose comments have appeared in our Mail Returns column. In the present issue (page 250) Mr. Whorf pushes his inquiry farther, showing how some languages resemble chemical compounds in the way their sentences are constructed, and others resemble mechanical mixtures. Mr. Whorf's studies in speech and logic are the outgrowth of an avocation commenced over a decade ago. He has lectured on linguistics at Yale.

Atomic Geometer. — To BERTRAM E. WARREN, '24, Professor of Physics at the Institute, diffraction of x-ray beams by various materials has disclosed rare and interesting knowledge of the infinitesimal worlds within crystals, liquids, and glass. His work on the structure of water was reported in The Review for February, 1939. In this issue (page 253) Professor Warren discusses how the geometrical demands of atoms govern the structure of glass. His article reports advances in this field of research which have been made since Philip M. Morse, Professor of Physics and Editorial Associate of The Review, summarized the situation in our issue for April, 1937.

To Instruct. — After varied executive experience in metallurgical industries, A. C. CARLTON, '17, became a teaching administrator through his post as curator of fuels and metals in the Chicago Museum of Science and Industry, which he describes for The Review (page 256) as an example of the modern museum in its function as an educational institution.



THREE JOBS...ONE IRON

Versatility in cast iron — especially when economically obtained... is a valuable asset for both the foundry and the user.

Consider, for example, the experience of a manufacturer of Diesel engines — and the economies effected by using one base iron to meet three distinct sets of requirements. One set calls for ability to resist wear and hold pressure at operating temperatures, the second for toughness and pressure resistance at the same temperatures, and the third for the wear resistance and toughness essential for timing gears and similar parts. Good machinability is, of course, a prime requisite in all three cases.

All these varied requirements are being met by using the same Chromium-Molybdenum (0.60—0.70% Mo.) base iron; only slight changes in the analysis are necessary. The practical and economical advantages to the foundry are obvious. And the user benefits by getting reliable, machinable parts at reasonable cost.

Our booklet, "Molybdenum in the Foundry", is both interesting and helpful. A copy will be sent to all those interested free on request.

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MOLY

MAIL RETURNS

Australia at War

From an Alumnus in Australia recently came to President Compton the letter below, which The Review is privileged to publish. Written on January 7 of this year, it gives in summary form an understanding of the determination and courage which have had other gallant expression in lands far from the Antipodes.

FROM UTAR JAMES NICHOLAS, '08:

Receipt of your annual President's Report for 1939–1940 has inspired me to write to you for the first time since my graduation in 1908. We Australians deeply appreciate promise of vast help outlined in President Roosevelt's inspiring message to Congress on January 6.

Fellow students at Technology in my day thought that Australia was a country of kangaroos, boomerangs, and bushwhackers. Today we are manufacturing and delivering airplanes, tanks, guns, rifles, and ammunition on a scale never before believed possible in this country. Our Australian diggers are fighting in North Africa. All are volunteers, for we have no conscription. Fifty thousand airmen — pilots and crews — are training for the Empire Air Scheme.

I cheerfully pay one-half of my income to the income tax department and will willingly pay still more when necessary. For we are going on — no matter what the cost in blood and treasure — until we are secure. We are all intensely loyal to our King. When we have reverses, the rate of recruiting is doubled or trebled, thus showing the temper of the people. . . .

Like Australia, you are far removed from the din of battle. May it never reach your shores.

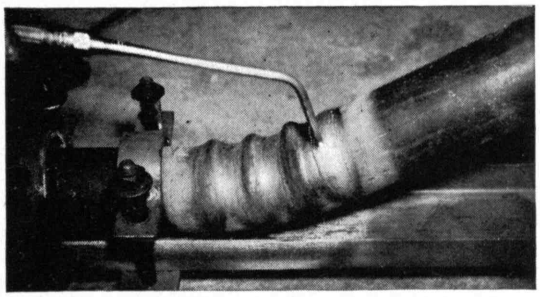
Melbourne, Australia

Here are a few of the things you can do—

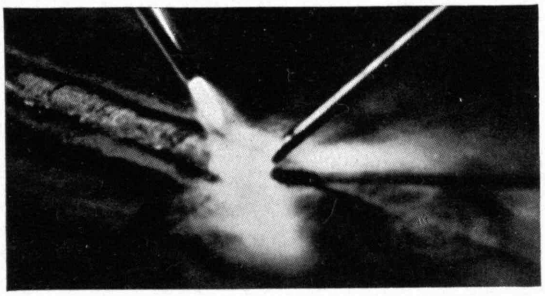
with the help of these dependable products . . .

In practically every industry—large or small—oxy-acetylene processes are used to speed production—to improve results—to lower costs—and to maintain efficiency of plant and equipment. A few of the things you can do with the help of Linde Oxygen, Prest-O-Lite Acetylene, and Union Carbide are outlined here.

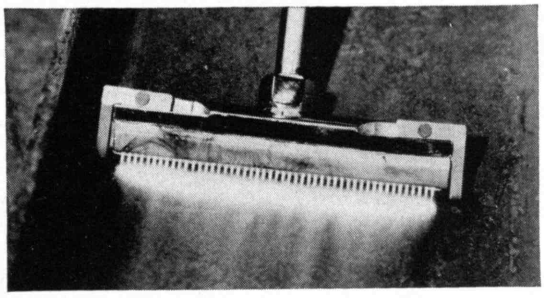
Shape Steel—Fast and economical flame-cutting reduces machining, grinding, and chipping operations. There are hand-cutting blowpipes and cutting machines for almost every cutting, gouging, and shaping need.



Form Metals—The oxy-acetylene flame is being used increasingly for such operations as "wrinkle-bending" of pipe and for straightening damaged metal sections. It should be applied where intense heat is required.



Join Metals—Oxy-acetylene welding makes it possible to join practically any metals, similar or dissimilar. Production oxy-acetylene welding is used wherever speed, strength, and good appearance are required.



Treat Metals—Oxy-acetylene flames are used both to surface-harden and to anneal steel and iron parts. The same flames are used for descaling to facilitate machining, and for cleaning to make paint last longer on steel.

Linde has the organization and the experience to help you use Linde products and processes profitably. If you want to know more about how to use the processes outlined above, *ask Linde!*

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbide Corporation
UCC
Offices in New York, Chicago, San Francisco, Kansas City, Birmingham, and other Principal Cities
In Canada: Dominion Oxygen Company, Limited

LINDE OXYGEN . . . PREST-O-LITE ACETYLENE . . . UNION CARBIDE . . . OXWELD APPARATUS

IN modern blitzkrieg armored forces must travel far and fast without breakdown or delay. Yet even the heaviest steel tank treads are surprisingly short-lived under the grind and pound of field operations. Engineers thought of shoeing these caterpillar-footed treads with rubber, since rubber far excels metal in resisting abrasive wear. Tests proved it was the answer. Not only do these rubber-armored treads long outwear naked steel, but they give Uncle Sam's new iron cavalry greater maneuverability, greater speed to deliver a knockout punch. Industry too finds this rubber-armoring process of great value in protecting equipment used in handling ores and other highly abrasive material. The G. T. M. (Goodyear Technical Man) will be glad to tell you about it. Write: Goodyear, Akron, Ohio or Los Angeles, California — or call the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER
GOODYEAR

Chester H. Pope, '09

Brocade and a Bali drummerboy

VOLUME 43 NUMBER 6

THE TECHNOLOGY REVIEW

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AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CONTENTS for APRIL, 1941

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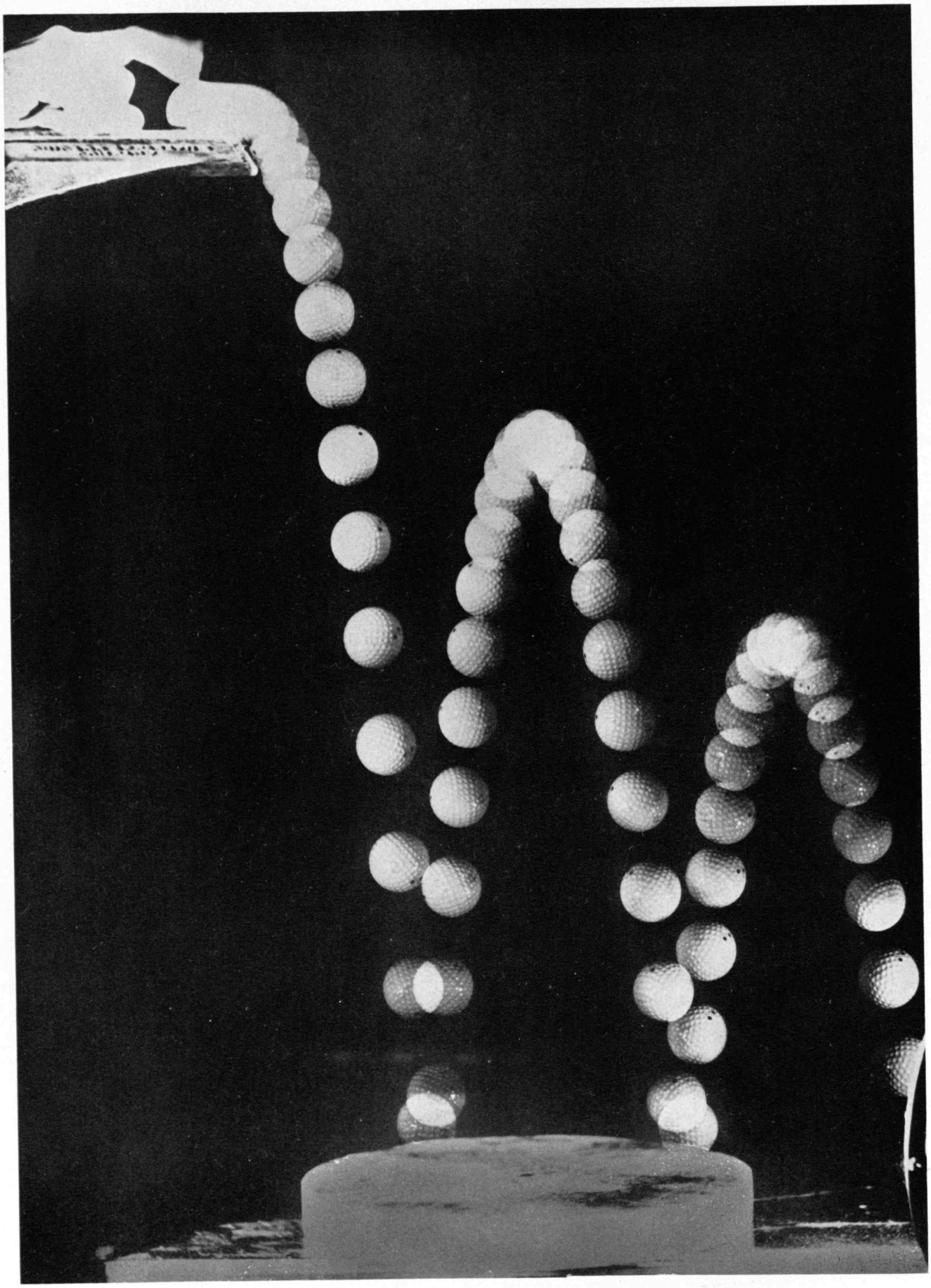


THE
TECHNOLOGY
REVIEW

Vol. 43, No. 6 April, 1941

The Trend of Affairs

Small Arms for Industry

IF the big machine tools — the roll grinders and the turret lathes — are the heavy artillery of industry, its small arms, complete with pistol grips and trigger switches, are the portable power tools. In 1937, out of a total machine-tool production valued at $216,000,000, such portable tools accounted for less than $20,000,000, a figure which indicates sufficiently well where the brunt of the work falls. In the hands of assembly men, construction workers, and millwrights, however, these easily handled tools are daily saving countless man-hours and performing operations which often would otherwise remain undone.

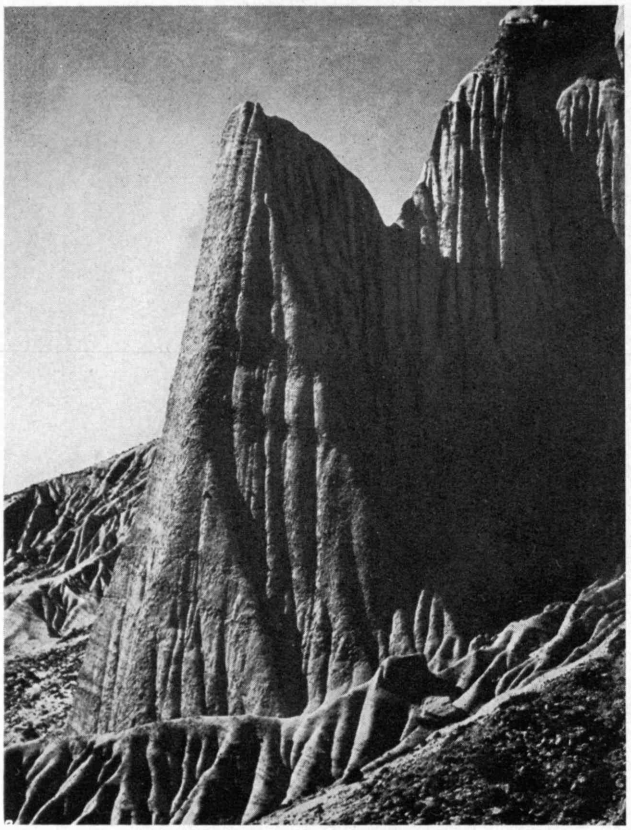
To achieve precision and high production, most machine tools sacrifice portableness and the ability to be guided by hand over irregular and shifting surfaces, for the two sets of conditions are virtually incompatible. The dentist who sights an interesting cavity in a wisdom tooth reaches for his portable drill, not for a mechanically guided boring mill; the welder who wishes to smooth a pass in the depths of a partially completed battleship brings his tool to the work and not vice versa. Half-built locomotives and airplanes, let alone coal mines and concrete buildings, are essentially not mobile. They must be treated not in the manner of a gear blank but as was Mohammed's mountain.

◀ *A new way of teaching school is presented in this multiflash photograph of a bouncing golf ball, one of a group of experimental pictures made at the Institute by Harold E. Edgerton, '27, Associate Professor of Electrical Measurements, and Francis W. Sears, '20, Associate Professor of Physics. Their work is discussed on page 244.*

Hand tools, of course, have the necessary flexibility of movement, but they are slow. A husky miner pounding at rock with a steel and a hand hammer can bore little more than five to ten feet of hole during an eight-hour day, whereas a modern pneumatic drill during the same time can penetrate 100 to 150 feet of rock. Virtually all forms of hand tools, including brushes, shears, saws, files, wrenches, screw drivers, and surely fifty-seven varieties of hammers, can be obtained in powered portable versions. The power source is almost exclusively electrical or pneumatic, the typical tool being driven by a high-speed universal motor through reduction gearing. Among other substitutes for human muscle is the gasoline motor; a European firm, for example, has designed a compact one-horsepower engine which can be strapped to the back like a knapsack.

As might be expected, power-driven portable tools are much faster than are their hand equivalents. One man with a pneumatic paving breaker can do as much work as can twelve or fifteen men with steels and sledges. One man with an electrically driven surface grinder can replace four or five working with hand tools. One carpenter with a portable electric saw is as effective as ten men with hand saws in erecting concrete forms. And so it goes.

In certain circumstances the power-driven tool is not only faster but also better. It can ram a mold in the foundry more thoroughly and uniformly than the molder can by hand. It will vibrate a lean, harsh concrete mix into place, whereas a crew without power would add more water and produce a more workable but weaker concrete. When supplied with an adjustable clutch, a nut runner will set nuts to within 10 per cent of a predetermined tension, much closer than can be expected of handwork. In this fact lies another reason why the air above the men on a modern automobile assembly line is cluttered with dangling, counterweighted power tools. Some jobs, such as smoothing irregular surfaces and removing burrs, cannot be done



Juanita Schubert

On these pages, textures in stone unused and stone at work. This is in Red Canyon, a section of the Mohave Desert, in southern California.

at all by a rigidly guided machine tool and are frequently uneconomical when they are performed by hand. As a result of the stress of world events, the most vital field for the portable power tool is at present the airplane industry. The greater part of the work involved in the production of the airplane structure is handwork, for the bulk and shape of the growing frame quickly preclude much machine work. The biggest items in the handwork are drilling the rivet holes and setting the 45,000 rivets in the typical small plane or setting the 450,000 rivets in the four-motored bomber. Here the usual situation is reversed: While much invaluable work is done by multiple-tooled floor machines, the brunt of the load falls on pneumatic or electric drills and hammers.

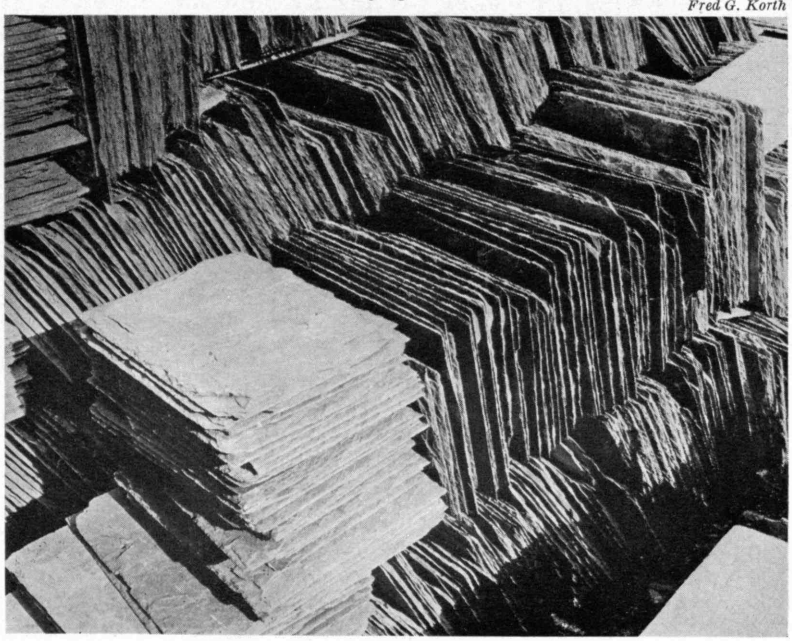
In many ways these portable tools are as striking an example of weightsaving and compactness as are the airplanes they help put together. Specifically, the most important elements in obtaining light weight with no sacrifice of ruggedness have been magnesium and aluminum die castings and heat-treated alloy-steel gears. Tiny grinders are available which can be held in the hand, like an outsize pen. Weighing well under a pound, one type is driven by an air turbine which can deliver one-sixth horsepower and which turns at 75,000 revolutions a minute under no load. Drills capable of boring holes up to one-quarter inch diameter in steel and weighing about two-and-a-half pounds have long ceased to be a novelty, while heavy-duty grinders built to spin eight-inch wheels need weigh no more than fifteen pounds.

Potpourri

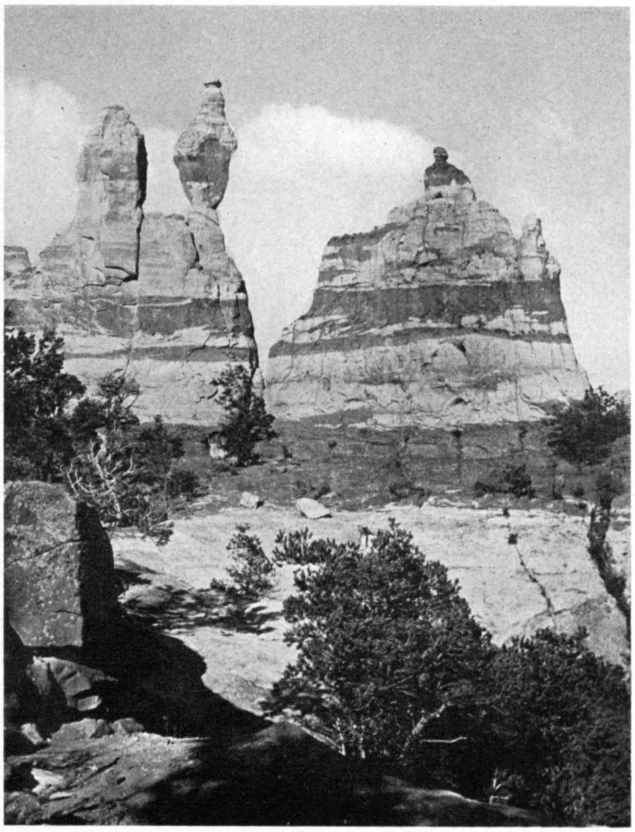
TALES of the sidehill ranger — the mythical beast whose starboard legs are shorter than those to port, for greater convenience in spiraling around and up the hills on which he loves to live — are recalled by the issuance to Henry Ford of a patent for a "hedge-hopping" tractor. The machine is designed with a novel wheel suspension which provides that all the wheels may be raised or lowered relative to the tractor itself. For plowing, when it is necessary that one of the drive wheels run in the bottom of the furrow and the other on the unplowed surface, the sidehill-ranger feature operates, the furrow wheel being dropped so that the tractor body proceeds without the list to one side which has heretofore been inescapable. When all wheels are arranged to provide maximum clearance of the body aboveground, the tractor may be used for the cultivation of relatively tall corn and similar crops. The wheel suspension utilizes cylindrical sleeves which can be locked in any of several rotatable positions around the axle tube. When the sleeve is rotated by means of a worm gear, the wheel is raised or lowered as desired. Adjustments can be made by the driver with the aid of an ordinary wrench. ¶ For late-evening kitchen lunchers a new wrinkle is a handle tab which, embedded in the paraffin sealing a jar of jam or jelly, both protects the preserves and eliminates the need for jimmying off the coating. The new device consists of a nickel tab from which a flat stem projects at right angles. The tab is placed on top of the preserve with the stem sticking straight up. The paraffin, poured on

Roofing slates

Fred G. Korth



as usual, covers the tab, but the stem sticks up through the paraffin seal, waiting the grasp of the luncher. ¶ To speed the mails still faster, highway postal-car service, utilizing specially designed motor buses, is being tested on three pilot routes. Equipped with facilities duplicating those in railway mail cars, one such bus is making regular daily round trips to serve towns along the 141-mile route between Washington, D. C., and Harrisonburg, Va. Pickup, sorting, and delivery of mail en route by means of the vehicles would allow the small community to have service equaling that enjoyed by larger centers. Some of the nation's 48,000 communities which lack railroad connection have been relying on contract motor-truck service. The mail for these communities has been sorted in a city post office, sealed into sacks for each town, and dropped off along the route, with mail for the city being picked up from each town on the return trip. The experimental service now being tested by the Post Office Department is expected to set standards for all vehicles destined to serve as traveling post offices for the better meeting of the needs of the star route towns. ¶ Plans for large-scale production of wind-power plants, reported as being formulated by the German electrical industry, call for outfits of three classes, with capacities up to 100 kilowatts, 100 to 1,000 kilowatts, and 10,000 to 20,000 kilowatts, respectively. The cost of generating electric power by wind is estimated as between .08 and .1 reichsmarks a kilowatt hour; the reichsmark nominally equals forty cents in United States currency. ¶ High price of the beads, plus the cost for extra labor, offsets the advantages to be had from adding tiny glass beads to the paint in highway traffic lines, according to California investigators. The beads, averaging about 1/100 inch in diameter, make the guide stripes on roads brighter and more effective at night by reflecting the headlight beams of automobiles and returning the color of the painted lines. Such lines, it has been found, wear well, one of them being easily discernible at night even after some twenty months of wear. The beads were judged economically justified for special locations. ¶ Bones as well as veins can serve as avenues for blood transfusions, two Philadelphia physicians report. Injection directly into the veins is in some conditions difficult if not impossible; hence the finding that substances injected into the bone marrow reach the blood stream without apparent change and in little more time than when directed into the veins offers encouragement in cases where transfusion is essential. Sugar solutions, blood plasma, and salt solutions may also be introduced in the system of a patient by transfusion through the marrow. Trying the method on seventeen patients, the doctors report meeting but one failure. ¶ Old salt mines, occupying 160 acres under the southwestern part of the city of Detroit, are regarded as admirable shelter for the whole 1,618,549 population of the city in the event of war needs. The caves are 1,100 feet deep, their ceilings supported by great pillars of salt. The temperature is constant at 58 degrees. People taking air-raid refuge in the old mines would not be able to hear even an intense bombardment going on above. The mines could also serve as shelter for essential industries, as a hospital, or as an ammunition dump, in the judgment of military officials. More than twenty-five miles of passageways fifty feet wide and twenty-two feet high are available in the mine.

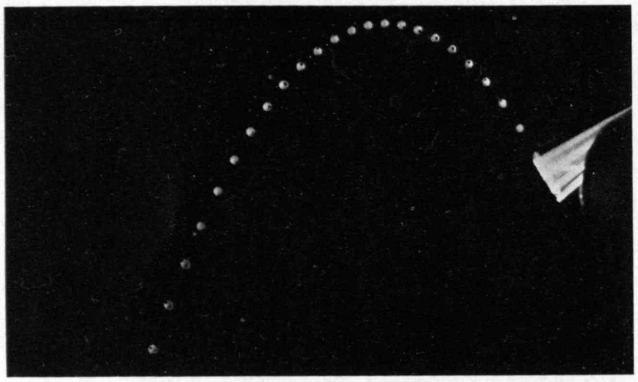


Paul J. Woolf

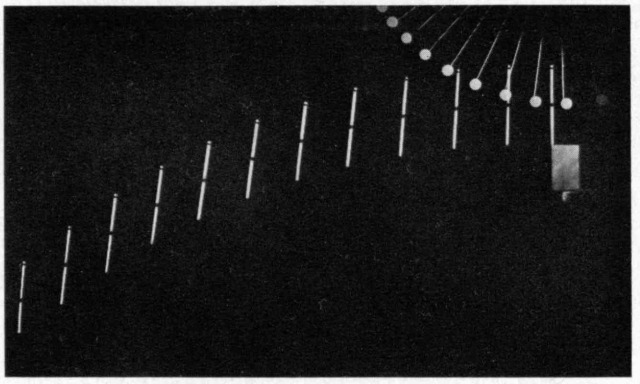
Gateway of the Giants, New Mexico

A cobbled street in Charleston, S. C.

F. S. Lincoln, '22



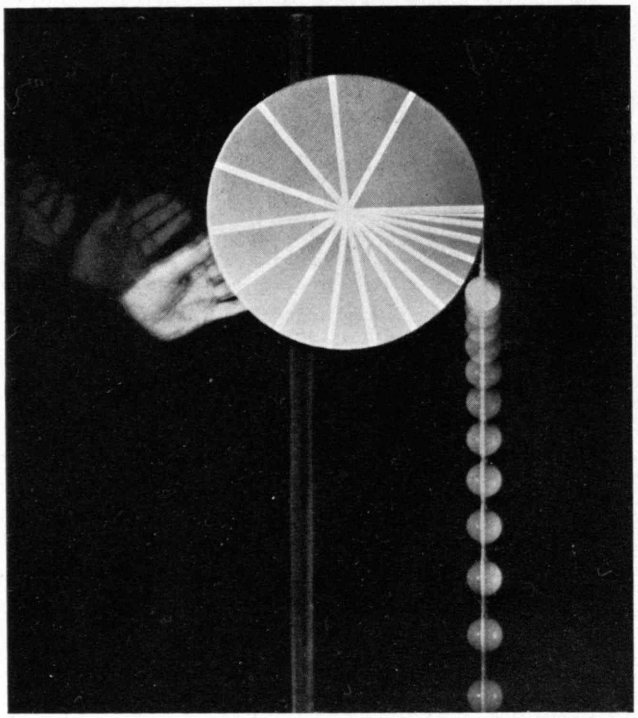
Successive photographs of a wooden bead in flight, taken at uniform intervals of time, show the path taken by a body in free space when it is projected at an angle. The horizontal distances covered during the intervals are equal; the vertical distances decrease steadily during the upward course, increase steadily on the way down. The path as a whole is a parabola.



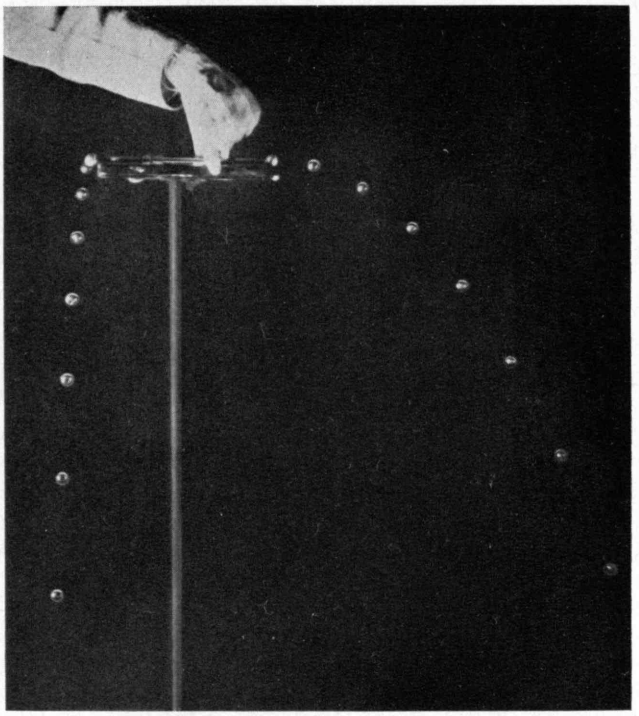
Motion of a rod struck at its center of gravity, indicated by the wide band. No rotation occurs; the center of gravity moves in a parabolic path resembling that taken by the bead in the adjoining picture. Downward acceleration and horizontal velocity are uniform. The pendulum that struck the blow appears at the upper right.

Pictures That Teach

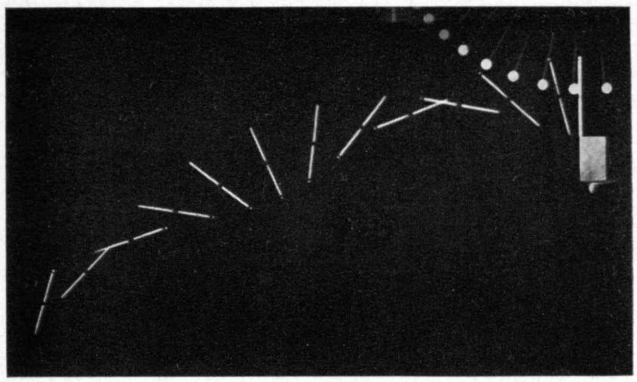
ANY physicist will tell you with vehemence that the fundamentals of his science are beautiful in their simplicity. The rippling rhythms of harmonic motion, the suave sweep of parabolic paths, the cunning counterpoint of deceleration during ascent, acceleration during descent — all of these and others combine as he rhapsodizes, and combining, they compose a compelling symphony of pedagogy and science merged. Only sour note, to the layman or to the beginning student, is that the physical phenomena embodying these motifs generally happen a little too fast to let the observer sense them bit by bit. The demonstration experiments upon which the lecturer relies to illustrate the fundamental laws and theories being expounded do afford the illustration, but so swiftly that it often must be taken on faith. If the acceleration of gravity, for instance, were very much smaller than it is, so that the motion of a swinging pendulum were slowed down until it could be followed almost step by step, simple harmonic motion might be a concept more readily grasped.



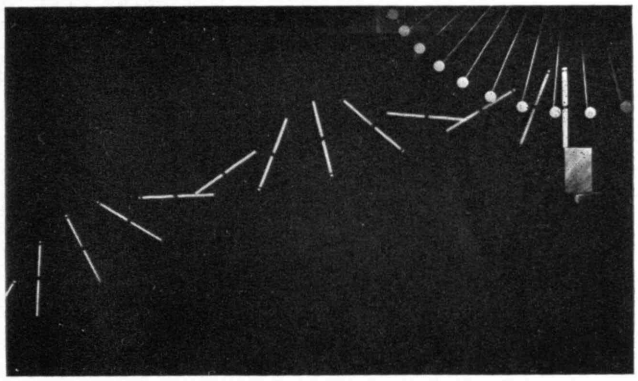
The relation between linear and angular acceleration is demonstrated as the weight drops, unrolling the cord wrapped around the disk. Motion of the disk may be judged by the spacing of photographs of the radial line on its surface. The acceleration of the falling weight equals the radius of the disk multiplied by the angular acceleration of the disk.



Two bodies released simultaneously — one dropped vertically, the other projected horizontally — fall at the same rate and land at the same time. Horizontal velocity of the projectile here is uniform. The mechanism does not release the two spheres exactly simultaneously; exposures at about 1/30 of a second show the ball at the left to have been given a tiny head start.



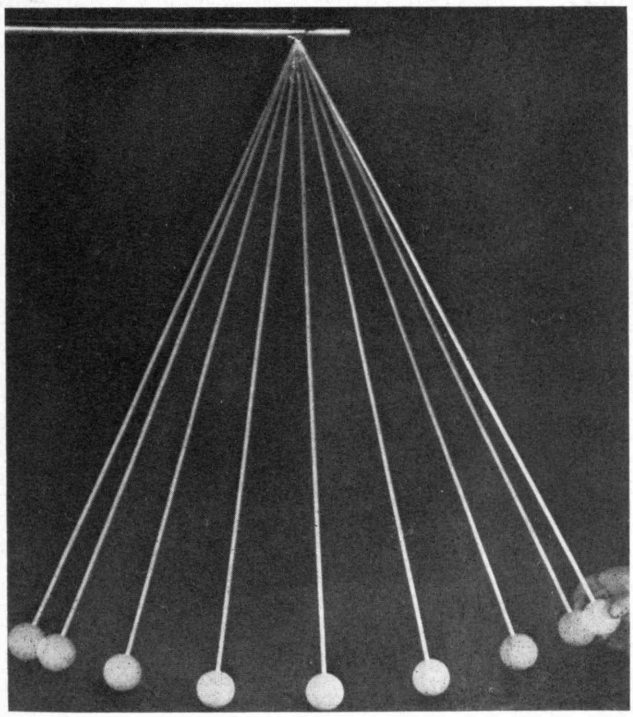
The same rod struck slightly above its center of gravity. Rotation has been acquired in addition to translation, but the center of gravity follows the same parabolic path, even though the rod rotates with uniform angular velocity about the center of gravity, completing one full revolution as the positions of its narrow-banded top indicate.



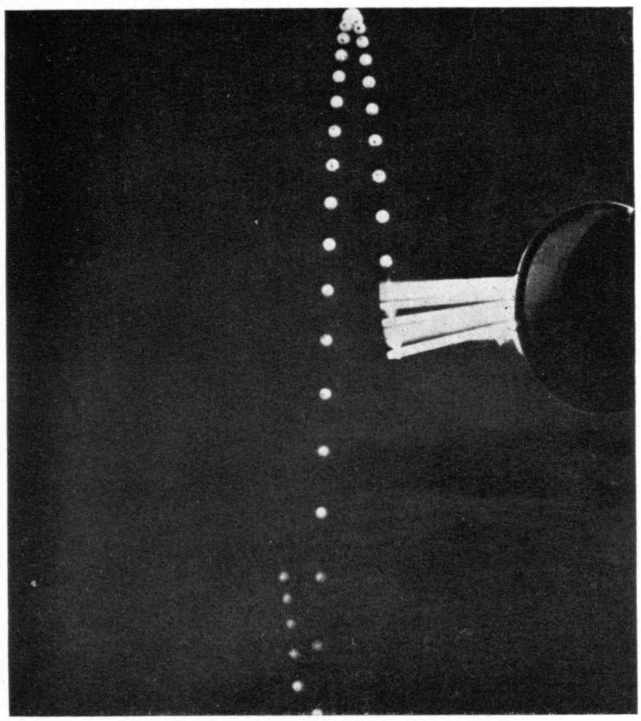
When it has been struck slightly below its center of gravity, the rod rotates in the other direction, completing a revolution during its flight. Rotation takes place with uniform angular velocity about the center of gravity. The center of gravity, however, sticks to the smooth parabolic path which may be traced by the successive positions of the wide band at the middle of the rod.

Better than mere slowing down, however, would be a method of breaking the demonstration phenomenon into a series of occurrences, allowing for a comparison of units in the series and consequent comprehension of what took place between them. Slow-motion moving pictures would readily enough provide the slowed-down demonstration. A series of still pictures, taken at very short intervals of time, gives the even more desirable sectionalized view of what actually happens when a swinging pendulum illustrates harmonic motion or a stick shows the path of a body moving in free space.

The new pedagogical technique which is illustrated in the accompanying photographs, and with which Harold E. Edgerton, '27, Associate Professor of Electrical Measurements, and Francis W. Sears, '20, Associate Professor of Physics, have recently been engaged at Technology, promises not only to provide answers to the problems suggested thus far in this account but also to offer other useful teaching applications. The multiflash photographic technique perfected by Professor Edgerton has been applied by him and Professor Sears to many of the demonstrations used by the latter in initiating first-year



Simple harmonic motion is illustrated by these standard-interval pictures of a swinging pendulum. The maximum velocity occurs at the center of the swing, with zero velocity at the end. The greatest acceleration takes place at the point where the pendulum is traveling at the slowest rate. The greatest velocity occurs at the point where acceleration is last.



When the bead is projected vertically rather than at an angle, horizontal motion may be ignored. Here uniform deceleration during upward flight and uniform acceleration during downward drop are clearly shown. Distances moved between flashes show that downward velocity of the sphere as it passes the starting point equals the upward velocity which it had at that point.

men into the elements of physics. Reducing the demonstrations to series of successive stop-motion flashes, the photographs make it possible to analyze and discuss the phenomena in detail. The photographs have been used as slides to illustrate the demonstration lectures; plans call for their being used later as problems for analysis.

The full implications of this form of visual education are of course not yet ascertained. Student response to the new technique has been excellent, so that much further use of the idea may well be made.

Ares and the Actuaries

MODERN war, as it brings death and destruction more bitterly home to civilian populations than ever before, lays added stress upon the interdependence of the community. This consequence takes a pecuniary expression in present British planning for the compensation of those whose property suffers damage; such damage, it is held, should be regarded as a community loss rather than as an individual loss, and hence the community as a whole should bear the burden of compensation. Insurance in the usual sense, however, is considered not practicable, because no basis for actuarial calculation is to be had. Not yet have we been able to compile tables of expectancy of the visits of the bomber.

The war damage bill embodying the government plan is frank in regarding the measures as a compromise between insurance and outright compensation. A compulsory contributory compensation plan for damage to fixed property is the most important provision of the bill. Property totaling in value between six and eight billion pounds is involved in the plan, which calls for contributions payable in five annual instalments — the first in July of this year — totaling 2.5 per cent on the capital value. The total contributions are expected to amount to about two hundred million pounds. If the total compensation payable exceeds this amount, the government will take care of the difference up to an additional two hundred million pounds. Subsequent excess loss is to be met half by government and half by increases in contributions payable. Compensation, under the plan, will be paid for all damage occurring during the first two years of the war — up to the last of August of this year. Additional legislation will be required should the war continue beyond that time. Payments necessary to provide for immediate repairs to essential properties, as the bill is drawn, will be made as the repairs are done. Other payments will be deferred, carrying interest at 2.5 per cent a year, and will presumably be made after the conclusion of hostilities.

Insurance against war risks of movable business assets, such as machinery and equipment, is provided for in a second plan. This insurance is to be compulsory for property exceeding one thousand pounds in value, and voluntary for property valued at less than that figure. Premiums are to be at the rate of 1.5 per cent for the period from the beginning of the war to the end of September of this year. Personal and household effects are to be insured under the provisions of a third scheme, which is entirely voluntary, at a rate of 1.5 per cent a year, the policies being issued on an annual basis. A total of fifteen hundred pounds is the limit which may be insured by one individual under the plan, with an addition of not more than five hundred pounds for a motor vehicle.

Westinghouse

Not the hands of an organist but those of an inspector checking arc extinguishers designed to do more efficiently the work formerly done by fuses. Capable of putting out an electric arc in 1/100 second, these devices prevent damage from short circuits.

Technology and Society

STRONG evidence of the increasing scope of governmental activity which S. McKee Rosen and Laura Rosen, authors of *Technology and Society*,* emphasize as characteristic of our time is the extent to which such a volume as theirs can rely upon government publications for source matter. Not very many decades ago, little more than tables of statistics were available from government as material for writers on sociological topics. In recent years, notably in the last decade and a half, have been added thoroughgoing economic and social analyses in dozens of fields, for the preparation of which able minds have been brought from nongovernmental agencies and for which virtually all techniques of exposition and portrayal are utilized.

Thus this volume draws freely on such official documents as the comprehensive study, *Technological Trends and National Policy*, issued in 1937 by the science committee of the National Resources Committee; various publications of the Works Progress Administration; and the findings of the President's Research Committee on Social Trends. The authors would have performed a highly valuable function if they had no more than siphoned in this fashion useful material from these stocks — stocks whose very (*Continued on page 277*)

* New York: Macmillan, 1941. xiv, 474 pages, $3.00.

Wars and Weather

Three Military Conflicts Have Given Rise to Noteworthy Advances in Weather Science; Long-Range Forecasts a Probable By-product of the Present Struggle

By Sverre Petterssen

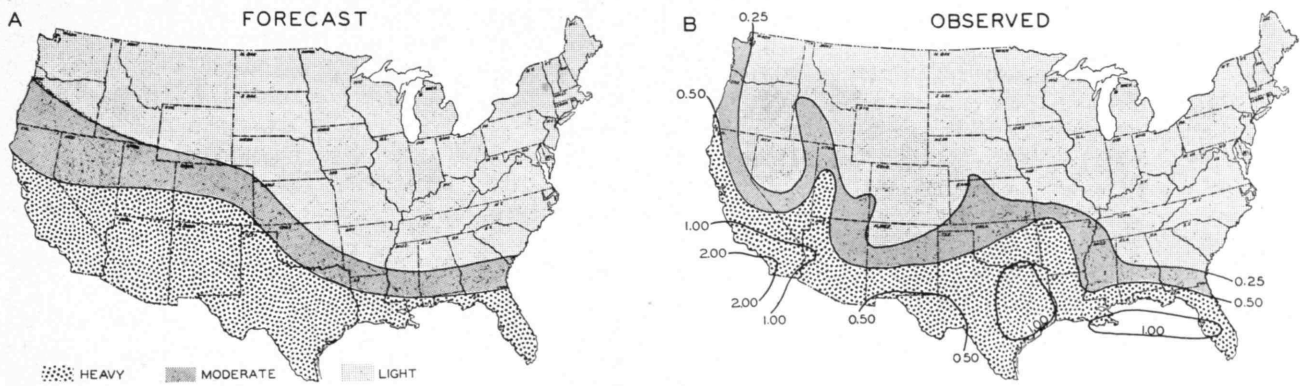
TYPICAL of a large number of weather phenomena is the fact that they develop around an unstable state of equilibrium, so that a small impulse may give rise to great events. The same condition is true, to a certain extent, of the history of weather forecasting. Wars and storms are quite frequent phenomena in Europe, and weather forecasting was initiated through a coincidence of a war and a storm. Actually, a singular feature of the history of weather forecasting is that the most noteworthy advances have resulted from three major impulses connected directly with wars.

Crimean War Starts Weather Forecasting. In 1854, during the Crimean War, a storm — or what meteorologists today would call a cyclone — arrived in the Black Sea, causing considerable damage to the French fleet and wrecking completely the battleship *Henri IV*. By this time the French astronomer Leverrier had won world fame on account of his "forecast" of the existence of a new planet. As is well known, Leverrier computed that an unknown planet existed within our solar system, and when the telescopes were directed to the computed spot, the planet Neptune was found. Napoleon III, who had invested much money and prestige in the Crimean War, apparently thought that if the scientists could forecast the existence of an unseen planet, they should also be able to forecast storms and other weather. He therefore charged Leverrier with what proved to be a difficult task — that of organizing a system for weather forecasting.

At that time there were no weather bureaus to turn to as sources of information, and no organized network of reporting stations existed. But from universities, from observatories, and from the few stations keeping meteorological logs, Leverrier was able to collect enough data to plot primitive weather maps and study the Black Sea storm post mortem. He found that the storm could be traced from one weather map to another, since it had developed and moved toward the Black Sea on a regular path and with a fairly constant speed. The conclusion he drew from this fact was that if observations made at a large number of stations could be reported with sufficient speed to some central office, one could, by plotting and analyzing weather maps, follow a storm from one chart to the next and extrapolate its future movement.

By this conclusion Leverrier had not solved any problem related to the physics or the dynamics of storms; he had merely shown that a simple freehand extrapolation of a storm path could give valuable results. An outburst of enthusiasm followed his report. Within a few years meteorological institutes and networks of reporting stations were established in most countries, and the first experiments with storm warnings and weather forecasting were commenced.

But the problem was soon found to be more intricate than had been anticipated. The Black Sea storm, a pronounced and clear-cut case, was easy to handle. Often, however, storms seemed to develop out of unstable conditions, and to find the small impulse which released these great events was difficult. Furthermore, very little was known of the mean, or normal, state of the atmosphere; and before something was known and understood thereof, it was difficult to handle the perturbations which were superimposed on the general circulation. Nevertheless, a sort of weather-forecasting service was developed on a purely empirical basis. The art of



An example of long-range forecasting. Map A is an M.I.T. five-day forecast of rainfall for the period February 22 to 26, 1941. Map B is rainfall actually observed during the same period.

forecasting consisted of memorizing similar situations, empirical rules, and rules of thumb. Thus, a young forecaster might have been advised by his senior colleague as follows: "If the barometer falls in Paris and rises in London, there will usually be an east gale in the English Channel." Why the barometer fell in Paris and why it rose in London were questions of theoretical interest only, which were left for the physicists to solve, if they felt so inclined. The empirical rules were mostly of local or regional value, with the result that a forecaster in London could learn but little from his colleague in Washington and vice versa.

The optimism created by Leverrier's report was soon followed by pessimism, and the problem of weather forecasting on a rational scientific basis was not seriously attacked until about the time of the first World War.

World War I and the Polar Front. The first World War gave a new and considerable impetus to weather forecasting. In the belligerent countries better forecasts were needed for the planning of aerial, gas, and other warfare, and in the neutral countries of Europe the food shortage caused consideration to be given to improvements in the weather service for the benefit of agriculture and fisheries. In Norway, which was heavily dependent on the day-to-day success of fishing, Vilhelm Bjerknes organized a small group of physicists to found weather forecasting on a scientific basis.

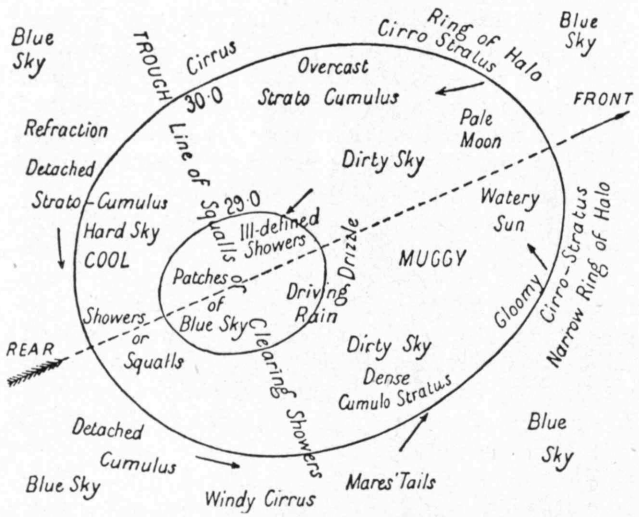


Fig. 1. Pre-1914 ideas of the distribution of clouds and weather around a cyclone. The closed curves are isobars around a low-pressure center.

Areas of low pressure (now called "cyclones," or "depressions") had long been known to be associated in general with high winds and bad weather. Figure 1 shows, diagrammatically, the distribution of clouds and weather around a cyclone according to the ideas prevailing prior to World War I. After studying a large number of individual cyclones, Jakob Bjerknes tried to draw a model, or a blueprint, of a cyclone in greater detail, such as the sketch in Fig. 2.

The most remarkable result of this investigation was the finding that the distribution of temperature, wind, and so on, around a cyclone is not continuous but is discontinuous. A tongue of warm air from the south

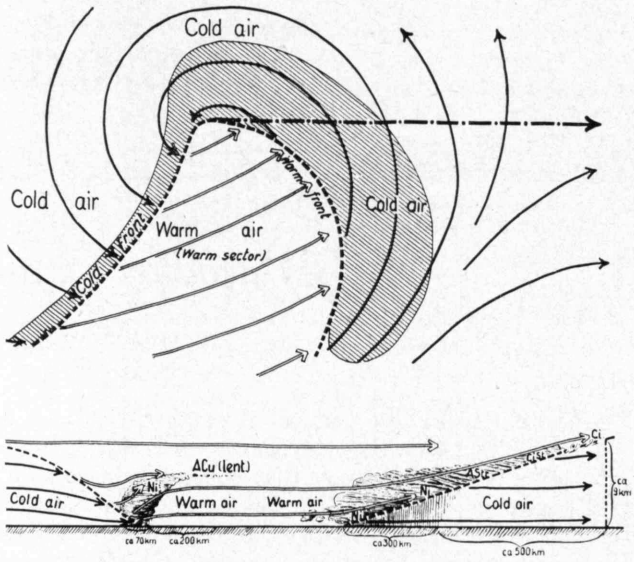


Fig. 2. Model of a cyclone, after Jakob Bjerknes and Halvor Solberg. The typical cyclone is built up of two air masses separated from one another by the polar front. The upper portion of the diagram shows the conditions along the earth's surface; the lower portion is a cross section through the cyclone south of the center. Ni = nimbus; ACu = alto-cumulus; AStr = alto-stratus; CiSt = cirro-stratus; Ci = cirrus.

extends into the center of the cyclone, where the pressure is lowest. The tongue of warm air is surrounded by a mass of cold air, the two air masses being separated by a line of discontinuity. Tracing the trajectories of the two air masses shows that the cold air originated in the polar regions, and the warm air in the tropics. A cyclone is therefore built up of two air masses separated from one another by a surface of discontinuity which marks the "fighting front" of the two enemies — the tropical air rich in moisture and heat energy, and the cold and dense polar air rich in potential energy. In true wartime lingo, this fighting front was named the "polar front."

Furthermore, the systems of clouds and the areas of precipitation were found to be oriented along the polar front, as the middle portion of Fig. 2 shows. In the left-hand section of the diagram, warm air is replacing cold air; this part of the polar front was called the "warm front." In the rear of the cyclone, cold air is replacing warm air, and this portion was called the "cold front." The passages of these fronts mark the sudden changes in wind and weather.

The cyclone model indicates not only the anatomy of the storm but also the underlying mechanism. The warm air, being less dense than the cold air, will tend to rise above the frontal surfaces, the inclination of which is about 1:100, as shown in the cross section south of the storm center. Since the ascending air cools adiabatically, condensation and precipitation occur. The contrasts in heat energy along the polar front and the difference in potential energy of the adjacent air masses are the main sources of energy for the creation of winds.

Cyclones Start as Unstable Waves on the Polar Front. Since the polar front separates a more dense mass from a less dense mass, wave motion may develop along the surface of separation in the same way that waves form on a water surface. The waves may be stable or unstable.

For example, the swell on an ocean represents the stable type of wave, which has a regular wave profile and travels with an almost constant amplitude. The ordinary waves caused by wind on a water surface are stable waves if the wind velocity is slight. If the wind is strong, however, the wave amplitude increases and the wave profile grows tall and slim, until eventually the wave breaks; this is the unstable type of wave motion.

Unstable water waves are controlled by gravity, which is a stabilizing force, and by wind shear, which tends to create instability. Halvor Solberg found that the waves which occur on the polar front are controlled by gravity, by the inertia due to the earth's rotation, and by the wind shear at the frontal surface. Gravity and inertia are stabilizing forces, but wind shear tends to create instability. Hence, if the wind shear along the polar front is sufficiently strong, unstable waves will form, a fact which gives us a clue to the understanding of the origin of cyclones.

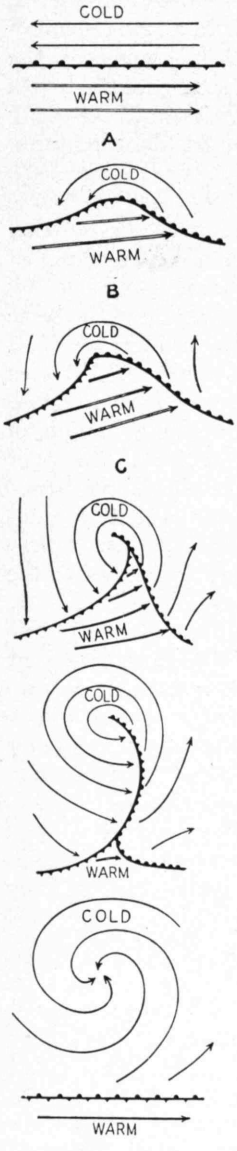


Fig. 3. Unstable waves on the polar front — the origin of cyclones. The waves increase in amplitude and the cold front overtakes the warm front, while the cyclone increases in intensity. In the later stages the fronts dissolve and the cyclone blows itself out.

In Fig. 3A the polar front separates a cold mass and a warm mass, which are streaming in opposite directions, and there is a considerable wind shear along the front. The surface of the polar front slopes northward at an inclination of about 1:100, so that when wave motion occurs on the frontal surface, the front at the ground will bulge north and south with an amplitude a hundred times that of the wave profile. In Fig. 3B a "young" wave has formed. Being unstable, this wave travels along the front with increasing amplitude; eventually the cold front overtakes the warm front, and the cyclone "occludes." The energy supply is then cut off, and the cyclone feeds for a while on kinetic energy already created. Gradually the kinetic energy is dissipated by friction. During this development, the fronts tend to dissolve and the cyclone evolves into a whirl of more or less homogeneous air. For example, the cyclone model in Fig. 2 is preceded by the wave stage and followed by the whirl stage.

The theory of frontal waves shows that only waves of certain lengths are unstable. This is because the stabilizing forces vary in strength with the lengths of the waves (see Fig. 4), whereas the unstabilizing force caused by the wind shear remains constant. If we add up the stabilizing and unstabilizing forces, we obtain four distinct types of waves on frontal surfaces:

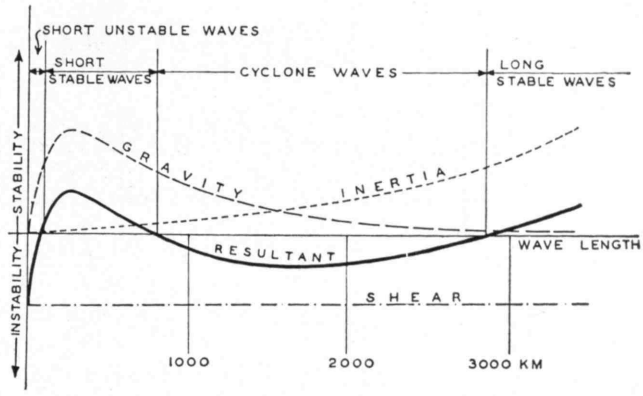


Fig. 4. Four types of waves which may occur on the polar front. Only those within the band from about 800 to 3,000 kilometers develop into cyclones.

(1) Short unstable waves, whose lengths are of the order of magnitude of a few kilometers. These waves are often visible in the sky as billow clouds.

(2) Short stable waves, which range from a few kilometers to about 800 kilometers. Within this wave band, the stabilizing forces are predominant; the waves travel along the fronts without developing into cyclones.

(3) Cyclone waves, which range in length from about 800 to about 3,000 kilometers. These are the unstable waves that develop into cyclones.

(4) Long stable waves, whose lengths exceed about 3,000 kilometers. Here the stabilizing force due to inertia is usually sufficiently strong to overcompensate for the influence of wind shear.

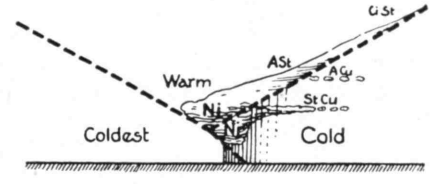


Fig. 5. Cross section through an occluded cyclone in which the cold air stream has cut under the warm air and driven it away from the earth. The occlusion process brings the potentially heavier mass under the potentially lighter mass and thus reduces the potential energy. This is the primary source of energy for the creation of storms.

A cross section through an occluded cyclone is shown in Fig. 5; the warm air which originally was at the ground is present aloft in a trough between the two cold masses. A comparison of this cross section with the one shown in Fig. 2 will reveal that the more dense and the less dense masses were originally side by side, and that after the occlusion process the former are under the latter. Hence the center of gravity of the system has been lowered, and potential energy has been liberated. As the fronts dissolve in the cyclone whirl, the available heat energy is used. In addition, considerable amounts of the latent heat of vaporization are made available through the condensation of aqueous vapor. The presence of stable waves results in a periodic conversion of potential energy into (*Continued on page 265*)

Languages and Logic

Chemical Compound or Mechanical Mixture, a Sentence Hides within Its Structure Laws of Thought Profoundly Important to the Advance of Science

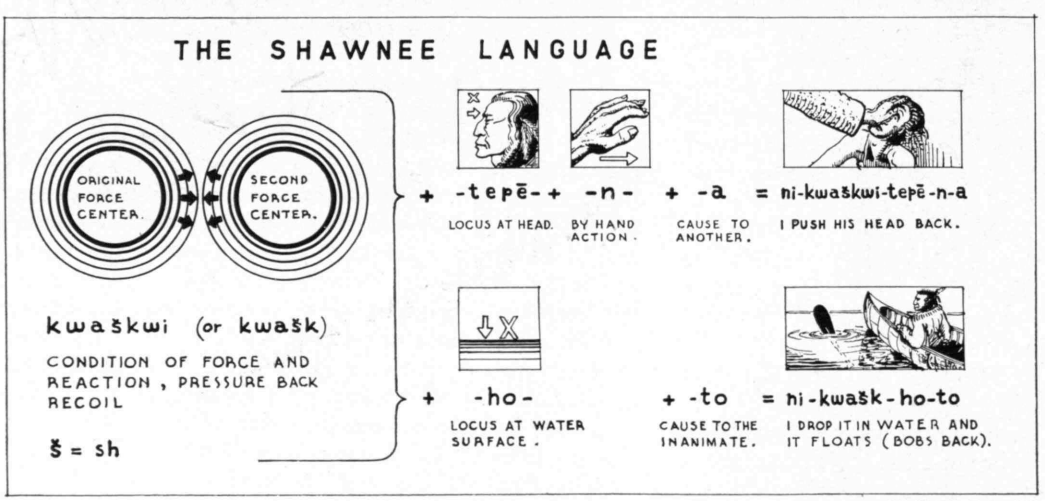
By Benjamin Lee Whorf

IN English, the sentences "I pull the branch aside" and "I have an extra toe on my foot" have little similarity. Leaving out the subject pronoun and the sign of the present tense, which are common features from requirements of English syntax, we may say that no similarity exists. Common, and even scientific, parlance would say that the sentences are unlike because they are talking about things which are intrinsically unlike. So Mr. Everyman, the natural logician, would be inclined to argue. Formal logic of an older type would perhaps agree with him.

If, moreover, we appeal to an impartial scientific English-speaking observer, asking him to make direct observations upon cases of the two phenomena to see if they may not have some element of similarity which we have overlooked, he will be more than likely to confirm the dicta of Mr. Everyman and the logician. The observer whom we have asked to make the test may not see quite eye to eye with the old-school logician and would not be disappointed to find him wrong. Still he is compelled sadly to confess failure. "I wish I could oblige you," he says, "but try as I may, I cannot detect any similarity between these phenomena."

By this time our stubborn streak is aroused; we wonder if a being from Mars would also see no resemblance. But now a linguist points out that it is not necessary to go as far as Mars. We have not yet scouted around this earth to see if its many languages all classify these phenomena as disparately as our speech does. We find that in Shawnee these two statements are, respectively, *ni-l'θawa-'ko-n-a* and *ni-l'θawa-'ko-θite* (the *θ* here denotes *th* as in "thin" and the apostrophe denotes a breath-catch). The sentences are closely similar; in fact, they differ only at the tail end. In Shawnee, moreover, the beginning of a construction is generally the important and emphatic part. Both sentences start with *ni-* ("I"), which is a mere prefix. Then comes the really important key word, *l'θawa*, a common Shawnee term, denoting a forked outline, like Fig. 3, No. 1 (page 252). The next element, *-'ko*, we cannot be sure of, but it agrees in form with a variant of the suffix *-a'kw* or *-a'ko*, denoting tree, bush, tree part, branch, or anything of that general shape. In the first sentence, *-n-* means "by hand action" and may be either a causation of the basic condition (forked outline) manually, an increase of it, or both. The final *-a* means that the subject ("I") does this action to an appropriate object. Hence the first sentence means "I pull it (something like branch of tree) more open or apart where it forks." In the other sentence, the suffix *-θite* means "pertaining to the toes," and the absence of further suffixes means that the subject manifests the condition in his own person. Therefore the sentence can mean only "I have an extra toe forking out like a branch from a normal toe."

Shawnee logicians and observers would class the two phenomena as intrinsically similar. Our own observer, to whom we tell all this, focuses his instruments again upon the two phenomena and to his joy sees at once a manifest resemblance. Figure 1 illustrates a similar situation: "I push his head back" and "I drop it in water and it floats," though very dissimilar sentences in English, are similar in Shawnee. The point of view of linguistic relativity changes Mr. Everyman's dictum: Instead of saying, "Sentences are unlike because they



del. Martin Rosse, '40

Fig. 1. The English sentences "I push his head back" and "I drop it in water and it floats" are unlike. But in Shawnee the corresponding statements are closely similar, emphasizing the fact that analysis of nature and classification of events as like or in the same category (logic) are governed by grammar.

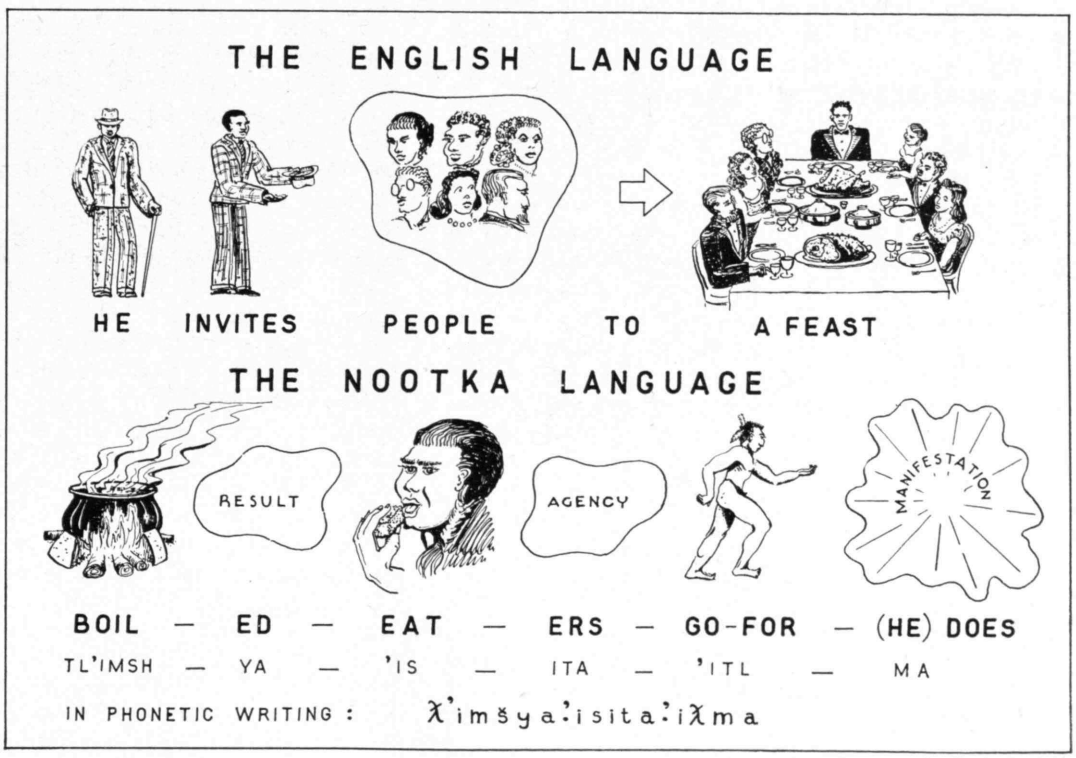
tell about unlike facts," he now reasons: "Facts are unlike to speakers whose language background provides for unlike formulation of them."

Conversely, the English sentences, "The boat is grounded on the beach" and "The boat is manned by picked men," seem to us to be rather similar. Each is about a boat; each tells the relation of the boat to other objects — or that's *our* story. The linguist would point out the parallelism in grammatical pattern thus: "The boat is *x*ed preposition *y*." The logician might turn the linguist's analysis into "*A* is in the state *x* in relation to *y*," and then perhaps into $fA = xRy$. Such symbolic methods lead to fruitful techniques of rational ordering, stimulate our thinking, and bring valuable insights. Yet we should realize that the similarities and contrasts in the original sentences, subsumed under the foregoing formula, are dependent on the choice of mother tongue and that the properties of the tongue are eventually reflected as peculiarities of structure in the fabric of logic or mathematics which we rear.

In the Nootka language of Vancouver Island, the first "boat" statement is *tlih-is-ma;* the second, *lash-tskwiq-ista-ma*. The first is thus I-II-*ma;* the second, III-IV-V-*ma;* and they are quite unlike, for the final *-ma* is only the sign of the third-person indicative. Neither sentence contains any unit of meaning akin to our word "boat" or even "canoe." Part I, in the first sentence, means "moving pointwise," or moving in a way like the suggestion of the outline in Fig. 3, No. 2; hence "traveling in or as a canoe," or an event like one position of such motion. It is not a name for what we should call a "thing," but is more like a vector in physics. Part II means "on the beach"; hence I-II-*ma* means "it is on the beach pointwise as an event of canoe motion," and would normally refer to a boat that has come to land. In the other sentence, part III means "select, pick," and IV means "remainder, result," so that III-IV means "selected." Part V means "in a canoe (boat) as crew." The whole, III-IV-V-*ma*, means either "they are in the boat as a crew of picked men" or "the boat has a crew of picked men." It means that the whole event involving picked ones and boat's crew is in process.

As a hang-over from my education in chemical engineering, I relish an occasional chemical simile. Perhaps readers will catch what I mean when I say that the way the constituents are put together in these sentences of Shawnee and Nootka suggests a chemical compound, whereas their combination in English is more like a mechanical mixture. A mixture, like the mountaineer's potlicker, can be assembled out of almost anything and does not make any sweeping transformation of the overt appearance of the material. A chemical compound, on the other hand, can be put together only out of mutually suited ingredients, and the result may be not merely soup but a crop of crystals or a cloud of smoke. Likewise the typical Shawnee and Nootka combinations appear to work with a vocabulary of terms chosen with a view not so much to the utility of their immediate references as to the ability of the terms to combine suggestively with each other in manifold ways that elicit novel and useful images. This principle of terminology and way of analyzing events would seem to be unknown to the tongues with which we are familiar.

It is the analysis of nature down to a basic vocabulary capable of this sort of evocative recombination which is most distinctive of polysynthetic languages, like Nootka and Shawnee. Their characteristic quality is not, as some linguists have thought, a matter of the tightness or indissolubility of the combinations. The Shawnee term *l'θawa* could probably be said alone but would then mean "it (or something) is forked," a statement which gives little hint of the novel meanings that



del. Martin Rosse, '40

Fig. 2. Here are shown the different ways in which English and Nootka formulate the same event. The English sentence is divisible into subject and predicate; the Nootka sentence is not, yet it is complete and logical. Furthermore, the Nootka sentence is just one word, consisting of the root tl'imsh *with five suffixes.*

arise out of its combinations — at least to our minds or our type of logic. Shawnee and Nootka do not use the chemical type of synthesis exclusively. They make large use of a more external kind of syntax, which, however, has no basic structural priority. Even our own Indo-European tongues are not wholly devoid of the chemical method, but they seldom make sentences by it, afford little inkling of its possibilities, and give structural priority to another method. It was quite natural, then, that Aristotle should found our traditional logic wholly on this other method.

Let me make another analogy, not with chemistry but with art — art of the pictorial sort. We look at a good still-life painting and seem to see a lustrous porcelain bowl and a downy peach. Yet an analysis that screened out the totality of the picture — as if we were to go over it carefully, looking through a hole cut in a card — would reveal only oddly shaped patches of paint and would not evoke the bowl and fruit. The synthesis presented by the painting is perhaps akin to the chemical type of syntax, and it may point to psychological fundamentals that enter into both art and language. Now the mechanical method in art and language might be typified by Fig. 3, No. 3A. The first element, a field of spots, corresponds to the adjective "spotted," the second corresponds to the noun "cat." By putting them together, we get "spotted cat." Contrast the technique in Fig. 3, No. 3B. Here the figure corresponding to "cat" has only vague meaning by itself — "chevronlike," we might say — while the first element is even vaguer. But combined, these evoke a cylindrical object, like a shaft casting.

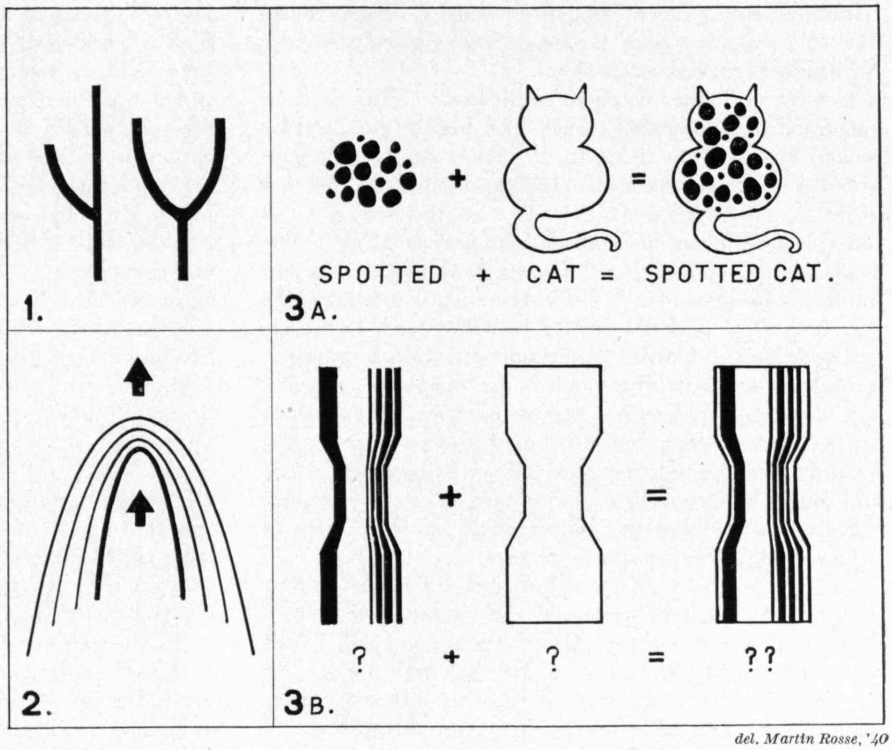


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Fig. 3. Suggested above are certain linguistic concepts which, as explained in the text, are not easily definable.

The thing common to both techniques is a systematic synthetic use of pattern, and this is also common to all language techniques. I have put question marks below the elements in Fig. 3, No. 3B, to point out the difficulty of a parallel in English speech and the fact that the method probably has no standing in traditional logic. Yet examination of other languages and the possibility of new types of logic that has been advanced by modern logicians themselves, suggest that this matter may be significant for modern science. New types of logic may help us eventually to understand how it is that electrons, the velocity of light, and other components of the subject matter of physics appear to behave illogically, or that phenomena which flout the sturdy common sense of yesteryear can nevertheless be true. Modern thinkers have long since pointed out that the so-called mechanistic way of thinking has come to an impasse before the great frontier problems of science. To rid ourselves of this way of thinking is exceedingly difficult when we have no linguistic experience of any other and when even our most advanced logicians and mathematicians do not provide any other — and obviously they cannot without the linguistic experience. For the mechanistic way of thinking is perhaps just a type of syntax natural to Mr. Everyman's daily use of the western Indo-European languages, rigidified and intensified by Aristotle and the latter's medieval and modern followers.

As I said in an article, "Science and Linguistics," in The Review for April, 1940, the effortlessness of speech and the subconscious way we picked up that activity in early childhood lead us to regard talking and thinking as wholly straightforward and transparent. We naturally feel that they embody self-evident laws of thought, the same for all men. We know all the answers! But when scrutinized, they become dusty answers. We use speech for reaching agreements about subject matter: I say, "Please shut the door," and my hearer and I agree that "the door" refers to a certain part of our environment and that I want a certain result produced. Our explanations of how we reached this understanding, though quite satisfactory on the everyday social plane, are merely more agreements (statements) about the same subject matter (door, and so on), more and more amplified by statements about the social and personal needs that impel us to communicate. There are here no laws of thought. Yet the structural regularities of our sentences enable us to sense that laws are *somewhere* in the background. Clearly, explanations of understanding such as "And so I ups and says to him, says I; see here, why don't you . . . !" evade the true process by which "he" and "I" are in communication. Likewise psychological-social descriptions of the social and emotional needs that impel people (*Continued on page 266*)

Glassy Geometry

How the Properties of Glass Depend on Atomic Arrangement; Research Finds Ways to Correlate the Two

By Bertram E. Warren

On the ways in which atoms hang onto each other depends everything that man does, not to speak of man himself, for which reason distinct interest invests the inquiries which science makes into the structure of matter. Often, however, these investigations appear so remote from immediate or practical concerns that the observer very easily misses the connection between a research and the make-up of his own frame. Often, moreover, because atoms are so bafflingly small and so deceptively elusive, the structure of matter in certain of its forms seems a question bound to remain virtually unanswered. Few problems can be conjured up which will offer greater difficulty, at first thought, than that of determining how the atoms are fastened together in a tiny crystal, as in a lump of rock salt or in a diamond. Yet this state of matter — the crystalline solid — is really so orderly and neat that it presents a comparatively easy task to the unraveler.

In a crystal, atoms of the elements making up the material are packed in a standard pattern, repeated over and over. Determine that pattern once, and the structure of the substance is clear. The process of making the first determination may be extremely difficult, but the difficulty is that involved in interpreting relations which, after all, are regular, however complicated they may be.

To unravel the systems by which atoms are assembled, the investigator has as his principal means the x-ray diffraction technique described in The Review for February (page 172), as it is used in studies of internal stresses in metals. The method, it will be recalled, takes advantage of the fact that x-rays impinging on a substance are bounced back from it, or diffracted, at angles dependent upon the distances separating the atoms composing the sample. Rebounding in this fashion, the x-rays produce on a photographic film ringlike patterns of lines (Fig. 1, page 254). From these, by mathematical analysis, arrangement of atoms in the specimen may be ascertained. Naturally, the more complex is the structure of the substance bombarded — the greater the number and kinds of atoms composing it, the more intricate the configuration in which they are packed — the more difficult it is to perform the mathematical operations necessary for interpretation of the photographs. If the structure is crystalline, the photograph will show good detail and can be interpreted by a comparatively simple technique. Amorphous structure, as in a liquid, however, gives a less detailed picture and makes interpretation difficult.

Here are reasons why our knowledge of the liquid state of matter is so scanty as to be practically negligible in comparison with our knowledge of the crystalline state: The atoms or molecules constituting matter in the liquid state are in a random arrangement, lacking the regularity of structure characteristic of the crystal. The x-ray diffraction patterns which liquids produce consist of broad rings with fuzzy edges. From these, the best knowledge obtainable concerns the distribution of neighboring atoms or molecules about any one molecule in the sample; the infinitesimal census cannot be extended over a long range by means of a regularly repeating pattern as is true in analysis of crystalline matter.

The difficulty here described makes particularly important the analysis of the structure of glass, for glass as an amorphous solid is a sort of halfway station between the neatly repetitive patterns of crystalline solid matter and the almost perverse indeterminacy of amorphous liquid matter. Water, for example, changes from amorphousness to crystallinity when it freezes into ice. Glass, which starts out as a collection of bits of crystalline matter — silica, soda, and so on — passes through a stage of being amorphous liquid matter as it is melted and fined in the pot, and then becomes what may be called an undercooled liquid — an amorphous solid. The atoms originally bonded into the orderly crystalline structure of the ingredients in the batch are still present in the unsymmetrical structure of the finished product. But the orderly system of bonding which held some of them together in the silica crystals, for instance, was disrupted when the heat of the melting pot increased the temperature vibration of each atom to a point beyond the strength of the forces of attraction which had held the atom in bond relationship with its neighbors. A new configuration came into being as the melt was cooled into glass — one is schematically shown in Fig. 2, page 255 — but it was chaotic as compared with the orderliness in the original ingredients.

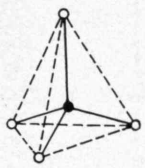
The geometry of this new configuration — the relations of distance and number involved in the assembly of atoms and ions (electrified particles formed through the gain or loss of electrons by neutral atoms or groups of atoms) — though it lacks the regularity of the geometry of crystalline matter, is of equal significance as a means of correlating and explaining the properties of the glass. Many of the chemical and physical properties of crystalline solids are known to result from the geometrical relations of the atoms and ions constituting them. The properties of amorphous solids — for instance, the fact that a glass has no definite melting point — may be explained similarly in terms of geometry, once the geometry has been established by the techniques which have been mentioned.

Through x-ray diffraction studies at the Institute during the past five years, a fairly definite idea of the geometrical structure of glass has been attained. Research which is now in process is aimed at correlating properties with that geometry in order to explain them. Two related problems in the properties of glass, it has been found, can be interpreted in terms of purely geometrical considerations. The first problem is that of immiscibility of glass melts; the second, that of the anomalous effects of boric oxide in glass.

Immiscibility is a phenomenon familiar enough; mix a cocktail and one need not worry about whether the ingredients will blend; mix a French dressing, and the oil and vinegar, however well shaken together, remain separate entities. The first combination is miscible; the second, immiscible. Perhaps it is appropriate that the glass of the cocktail shaker or the dressing cruet should offer an answer to the question of why some things mix and others don't. Glass made of soda and silica resembles the cocktail; in a soda-silica melt there is complete miscibility over the whole range of composition.

Lime-silica glass resembles the French dressing in some measure, for when the lime content is low, such a melt will segregate at certain temperatures into two phases which are immiscible. Whether immiscibility is a good or a bad thing depends upon the purpose for which the batch of glass is designed. The opacity, for instance, which results from immiscibility, may be desired for some uses. The important matter is to find out why a batch separates into two liquids, as in the French dressing, and to find out proportions of ingredients and temperatures of operation which will control the batch and prevent the phenomenon. Since the making of glass was for years more an art than a science, the question of the cause of immiscibility has only in our own time been attacked from the point of view of atomic relations.

To see how the geometry of the lime-silica combination explains why a batch of given proportions will, at a certain temperature, follow the example of the salad dressing rather than the cocktail, consideration of the structure of a soda-silica glass will be useful. The soda-silica combination, it will be remembered, remains miscible throughout. In that combination, each silicon atom is bonded to four oxygen atoms in such a way that the oxygens occupy the four corners of a tetrahedron, in the center of which is the silicon, like this ⟶



Every oxygen atom in the mixture is bonded to at least one silicon atom. But, because the ingredients of the batch are sodium oxide (Na_2O) and silicon dioxide (SiO_2), the number of oxygen atoms in the mixture is more than twice the number of silicons, and as a result some oxygen atoms are bonded to only one silicon. The sodium in the mixture is in the form of positive ions which have lost one electron and which are distributed at random in the holes of the oxygen-silicon network, each sodium in contact with about six oxygens. Figure 2 shows an idealized horizontal slice through this structure; because the figure is in two dimensions only, it shows the silicons bonded to only three oxygens, the fourth being in the third-dimensional plane either above or below the silicon, and hence not represented. The figure indicates that each atom is bonded to its neighbors in a fairly definite way, but that the scheme of structure is so flexible that it is not necessary for any unit of structure to repeat itself at regular intervals as in a crystal. Such flexibility of configuration is the essential difference between a glass and a crystalline solid.

Now in a lime-silica melt of relatively low lime content, the structure is essentially the same as that which has been described. The positive sodium ions are replaced, of course, by positive calcium ions. The calcium ions have lost two electrons as against the one lost by the sodium ions. The number of oxygen atoms in the mixture is again more than twice the number of silicon atoms, since the ingredients are calcium oxide (CaO) and silicon dioxide (SiO_2). As in the soda-silica melt discussed above, the silicon atoms strive to keep themselves constantly bonded to four oxygens, and the more oxygens there are available, the easier it is for the silicons to do so. The strong bonding of the silicons to all available oxygens tends to hold the melt together in a single phase, corresponding to the blending of the ingredients of the cocktail. But another effect occurs which works in the opposite direction.

Those oxygens which are bonded to but one silicon — of which there are quite a number because of the proportions of the ingredients of the batch — are unsaturated; that is, their electrostatic attractive forces are not exhausted by the job of hanging onto a silicon atom. They hence have some unused force, which tends to pull toward them the calcium ions which are wandering around in the melt. The calcium ions, it will be remembered, have lost two electrons, and they are for this reason considerably less docile than the sodium ions of the soda-silica combination which has been discussed. The calciums seek to get into surroundings which will stabilize them — surroundings consisting of six unsaturated oxygen atoms. Each unsaturated oxygen must be in contact with more than one calcium for stabilization, however, since the number of unsaturated oxygens is only double the number of calciums. Unless

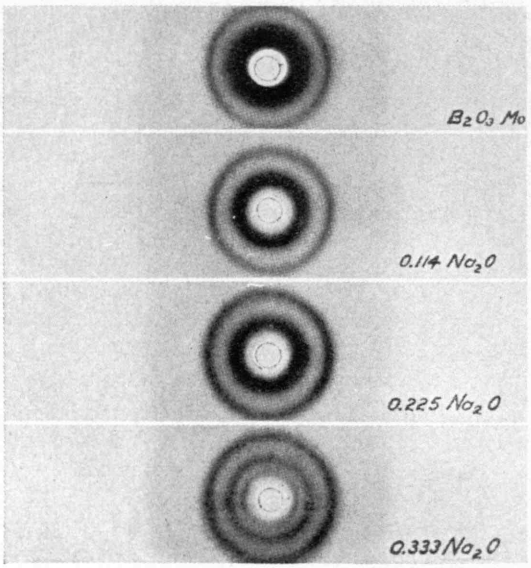
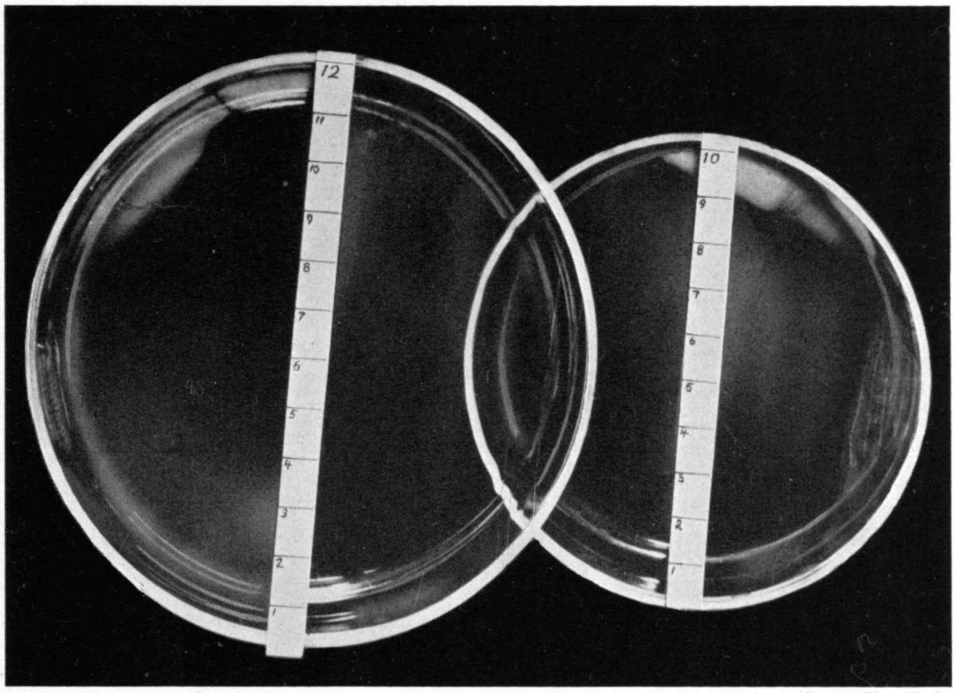


Fig. 1. X-ray patterns of soda–boric-oxide glass



Shallow dishes made of "preformed" glass. That on the right was, before an acid- and heat-treating process, the same diameter as that on the left. After the shrinkage, the glass consists of about 96 per cent silica and 4 per cent boric oxide and has many of the good qualities of fused silica without the expense and difficulty of direct manufacture from silica.

Corning Glass Works

the geometrical relations of the system of calcium, oxygen, and silica are such that the necessities of the calcium ions and the unexhausted attractive powers of the unsaturated oxygen atoms can be satisfied within the single phase — that is, the cocktail — there will be trouble. The unsaturated oxygens — potential two-timers — and the philandering calcium ions will, if they can't be accommodated in orderly society, go off by themselves and set up a polygamous regime of their own. The result in terms of the glass melt will be separation of the liquid material into two immiscible phases, one of which, at about 1,700 degrees centigrade, will be almost pure silica; the other will be about 28 per cent calcium and the rest silica.

For control of this situation the question of importance is obvious: What geometrical arrangement of atoms will permit calcium ions to be surrounded by six unsaturated oxygens and will permit the unsaturated oxygens to remain bonded to silicons as well? The answer is principally a matter of the volume of glass available to each calcium ion, or the reverse, a matter of the percentage of calcium in the batch. Calcium ions have to share among themselves the unsaturated oxygens; hence the distribution of calcium ions must be conditioned by the distances which this necessity permits between them.

Obviously, two calcium ions which are in contact with the same oxygen cannot be farther apart than twice the sum of the calcium and oxygen radii, a distance which figures out as 4.76 angstrom units. If we start with this calcium-to-calcium distance, we can reckon that in a random distribution of atoms, the volume of glass per calcium will be of the order of the cube of the linear separation, or 108 cubic angstroms of glass for each calcium. Such a volume is produced by a batch containing 33 per cent of calcium. Enough unsaturated oxygens will be present to surround the calcium ions properly and yet maintain their bonds with silicon atoms. In short, the calcium content will be high enough for the calcium ions and the single-bonded oxygen atoms to be satisfactorily close to each other, and stability will result. If the calcium content is less than 33 per cent, for the temperature conditions assumed in this example (1,700 degrees centigrade), the calcium ions cannot collect about themselves the desired number of oxygens within the available volume of glass, and the separation into two liquids will follow. At higher temperatures, a lower calcium content will be sufficient for miscibility.

The matter of immiscibility, then, boils down to the fact that when the geometry of distribution of atoms will not allow satisfaction of the requirements of the atoms, a new distribution results. In a sense, the situation resembles packing bricks and cork stoppers in a barrel of water — if there are bricks enough, the corks can be kept under water; if there are not enough bricks to make a network holding the corks under, a new distribution will occur. (*Continued on page 273*)

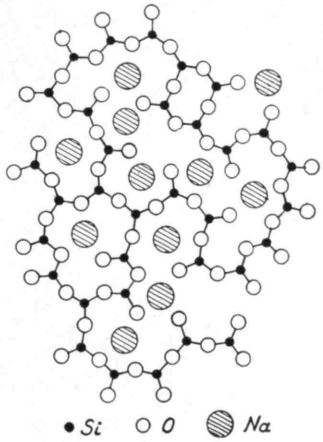


Fig. 2. Schematic representation in two dimensions of the structure of soda-silica glass. To correspond to two dimensions, the silicons are shown bonded to three oxygens rather than to four. Each silicon atom is actually linked to four oxygens, the fourth being directly above or below the silicon and therefore not shown.

"Patternes and Samples"

Chicago's Museum of Science and Industry Expresses the Teaching Function of Such Institutions—an Idea Implicit in Earliest Proposals for Museums

By A. C. Carlton

SCIENCE Discerns the Laws of Nature—Industry Applies Them to the Needs of Man. Thus reads the inscription on the walls of the rotunda of the Museum of Science and Industry in Jackson Park, Chicago, defining the scope and underlying purpose of that teaching institution.

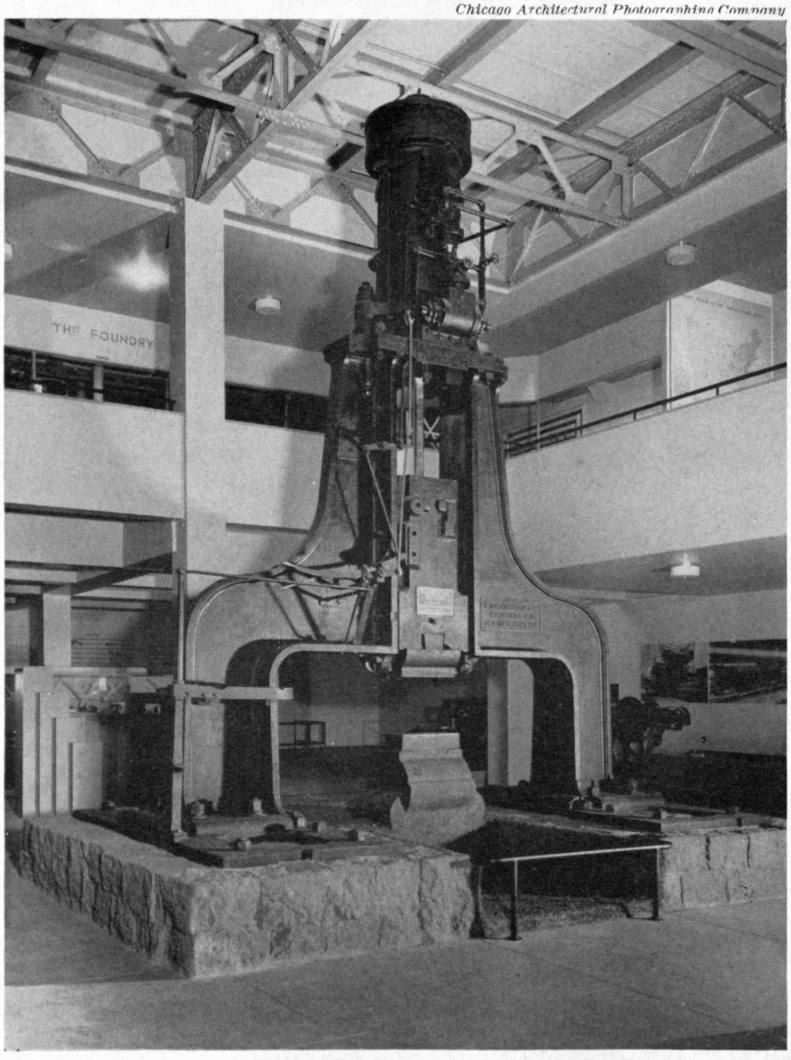
Scientific and industrial museums were not originally conceived by this generation nor by those immediately preceding it. Francis Bacon's *New Atlantis*, first published in 1627, included in his utopia: "For our Ordinances and Rites: Wee have two very Long, and Faire Galleries: In one of these wee place Patternes and Samples of all manner of the more Rare and Excellent Inventions: In the other wee place the Statua's of all Principall Inventours. . . ."

René Descartes (1596–1650) suggested a collection for the instruction of artisans. Almost two centuries later, at the time of the French Revolution, a decree was passed authorizing the formation of the Conservatoire des Arts et Métiers, wherein machines, models, tools, drawings, and so forth should be deposited, and the construction and uses of these tools and machines should be explained. The *conservatoire* was established in the sequestered priory of St. Martin des Champs, and this, the oldest of the industrial museums, has remained there to this day. It is, and always has been, an adjunct to the École Centrale des Arts et Manufactures and is used principally by that school.

In London, the science museum owes its founding to the Great Exhibition of all Nations of 1851. Temporary buildings in South Kensington housed the first collection in 1853, and since that time this museum has continued to expand both in scope and in the extent of its collections. South Kensington was the first to display operating exhibits.

This Nasmyth steam hammer, reputed to be the first used in America, is displayed in the Museum of Science and Industry, Chicago.

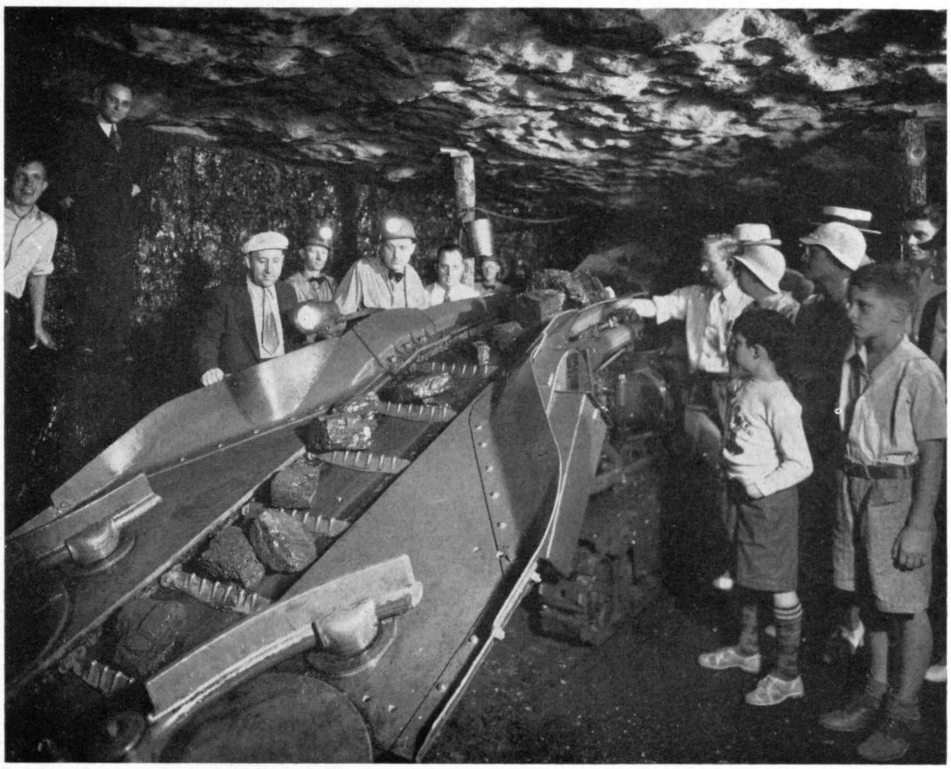
Chicago Architectural Photographing Company



Oskar von Miller, beginning in 1903, conceived, planned, and operated in Munich for many years Das Deutsches Museum von Meisterwerken der Naturwissenschaft und Technik, Europe's foremost scientific and industrial museum. Von Miller, a distinguished electrical engineer, revolutionized the technique of the teaching museum and contributed more than any other person toward the development of industrial museums. Shortly after the founding of the Deutsches museum, Das Technische Museum für Industrie und Gewerbe was organized in Vienna and patterned after its more famous progenitor.

All of this early development occurred in Europe, curiously enough, and the United States, the world's leading industrial nation, had no part. The anomaly no longer exists, however, as there are now in this country three museums comparable with the leading European institutions. They are the New York Museum of Science and Industry; the Franklin Institute, Philadelphia; and the Museum of Science and Industry, Chicago. All have slightly different philosophies, but all have as a fundamental aim the teaching of scientific principles and their industrial applications. American museum officials have learned much from European museums at Munich and elsewhere but are not slavishly following them. Rather are the Americans profiting by Europe's experience.

Julius Rosenwald, Chicago philanthropist, was greatly interested in von Miller's Deutsches museum, which he visited in Europe some years ago. He returned to Chicago imbued with the desire to make possible a similar institution in this country. After considerable thought he expressed his hopes before the Commercial Club of Chicago. The members were heartily in favor of the project, and Mr. Rosenwald made available $1,000,000 to be used in studying European museums and in planning the Chicago institution. Visits to the Munich museum and others followed; Dr. von Miller and his associates went to Chicago, and all agreed that an institution of the magnitude visualized needed far more money than that originally provided. Mr. Rosenwald contributed an additional sum of $2,000,000.



Chicago Architectural Photographing Company

A group of visitors watch a coal-loading machine at work in the museum's coal mine.

Meanwhile, the beautiful art palace of the World's Columbian Exposition of 1893, being of temporary construction, was rapidly falling to ruin. Interest of public-spirited citizens resulted, in 1924, in the floating of a bond issue of $5,000,000 to reconstruct the building, using permanent materials — exterior walls of Indiana limestone, roof of copper, and so forth. No definite decision was made about the use to which the building would be put, as the activating motive was primarily the preservation of a beautiful monument. Later it was discovered that $5,000,000 would not suffice to complete the restoration. Mr. Rosenwald then offered to contribute the difference between the total cost and the amount of the bond issue, provided the building were used exclusively to house an industrial museum. His offer was accepted, and the reconstruction of the building began in 1929. Exterior construction was completed in 1931, and a small section (40,000 square feet) of the interior was partly finished to permit occupancy in 1933. This section was used from July, 1933, to March, 1938, for the display of exhibits, including a full-size, operating coal mine. In 1936 a contract for the completion of the interior was let, and another section of the building, the west pavilion, likewise with a floor area of approximately 40,000 square feet, was completed, filled with displays, and opened to the public in March, 1938. The section which had been occupied during the preceding five years was then cleared of exhibits and turned over to the building contractor for finishing. The interior of the entire building was completed in December, 1938. Since that time installation of exhibits has been in progress.

The total attendance in these temporary areas for the period from July, 1933, to October 26, 1940, was 3,134,838. On the latter day the main central section was opened to the public, and the attendance figures from that date to the end of 1940 reached 141,482.

The primary purpose in opening part of the building prior to the completion of the entire structure was to confirm or disprove theories as to what constitutes interesting and instructive exhibit material. Exhibits were modified in many instances and replaced by other types of material at rather frequent intervals. Meanwhile, detailed studies of visitors' reactions were made. In other words this space served as a proving ground to guide in the planning of the finished museum.

The museum building consists of a central pavilion (500 feet by 300 feet), two wing pavilions (each 210 feet by 130 feet), and galleries connecting the wings to the central pavilion. A dome surmounts each of the three pavilions. The ground area is 263,000 square feet, considerably larger than the Capitol at Washington, and the over-all length from east to west is almost a quarter of a mile.

The total floor area of the building is roughly 600,000 square feet, of which two-thirds is allocated to exhibits. The remaining third contains an auditorium (seating 1,000), a large lecture room (seating 300), a number of small lecture rooms, library facilities (including reading rooms for adults and children and stack space for 170,000 volumes), cafeteria, staff dining room, children's lunchroom, kitchens, offices, laboratories, shops, studios, and all service facilities.

The focus of interest from the architectural point of view is the rotunda under the dome of the central pavilion. The rotunda is 80 feet in diameter and rises 120 feet to the under surface of the dome, which is supported by four huge piers faced with white marble. Radiating from the rotunda in the four cardinal directions are great

halls 90 feet wide and 65 feet high. The east and west halls are 210 feet long, and the north and south halls, 120 feet.

The architectural style is based on Greek Classic applied to a modern plan. The 276 Ionic columns, the doorways, and the exterior ornamental moldings were copied from those on the Erechtheum, as were the twenty-four caryatids. Each of the latter is thirteen feet high and weighs six tons. Frieze and metope panels of the Parthenon were reproduced in actual size. The interior is not incompatible with the Classical exterior, the plan is flexible, all necessary facilities are provided in abundance, the great halls are dignified and impressive, and the rotunda is inspiring.

The ten acres of floor space contain exhibits covering the physical sciences, and all important industries have been arbitrarily divided into nine departments. These departments, with some of their more interesting and important exhibits, are as follows:

(1) *Physics.* Stroboscopic-light demonstration; high-frequency induction demonstration; whispering gallery; binaural-hearing demonstration; operating exhibits explaining Newton's three laws of motion and Cavendish's experiment for measuring the gravitational constant.

(2) *Chemistry.* Periodic table of the chemical elements in a beautiful setting at the center of the main rotunda; full-scale alchemist's laboratory and modern laboratory alcoves; operating exhibits explaining chemical laws and reactions.

(3) *Fuels and Metals.* This department will be discussed at some length in subsequent paragraphs.

(4) *Agriculture, Forestry, and Textiles.* Machines and models illustrating historical development of agricultural machinery; spinning and weaving demonstration; termite colony with hundreds of the insects at work under glass; woodworking machinery in operation.

(5) *Power.* Corliss engine (1893) in operation; demonstration of man-made lightning with a million volt surge generator; series of models of mechanical motions; diorama (sixty-five feet long) showing generation, transmission, and utilization of electric power.

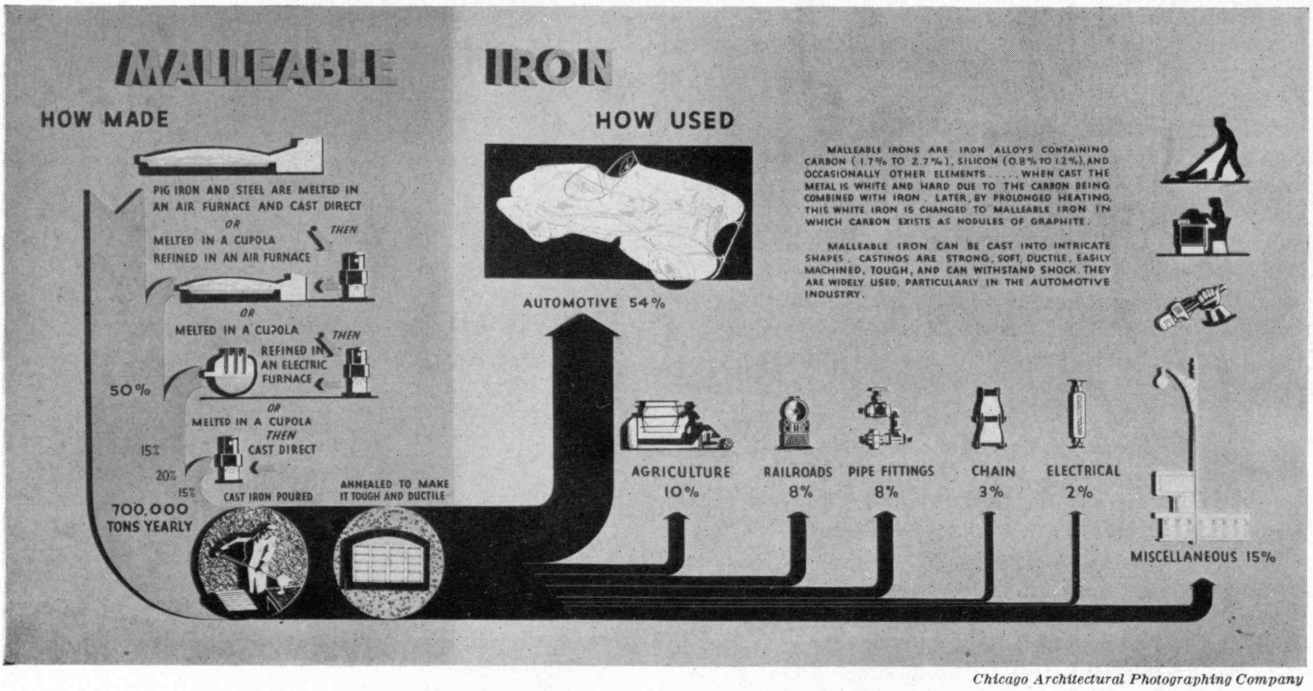
(6) *Transportation.* Historical airplanes suspended from the ceiling of the east hall; driving gear and steam-distribution system of a modern locomotive (operating); demonstration of antiknock testing of motor fuels; demonstration of steel being cut under water; a huge model railroad with full-size controls.

(7) *Graphic Arts.* Modern rotary press on which will be printed the museum newspaper; modern job-printing shop in which letterpress operations are demonstrated; offset lithographing press in operation.

(8) *Engineering Construction.* Model of the Parthenon; original structural bay of the Home Insurance Building, the first skyscraper, partly stripped to show skeleton construction; operating diorama of the Pennsylvania Railroad Company's vertical-lift bridge over the Chicago River, equipped with spot lighting and recorded lecture; pit lined with several types of sheet piling in which pile driving and electric-shovel operations are demonstrated with small machines.

(9) *Medical Sciences.* The transparent woman; embryos and anatomical sections; historical pharmacist's shop; series of dioramas showing development of surgery.

This list, it is believed, will indicate the general character and scope of the museum. Visitors are, of course, privileged to spend their time at the museum as they see fit. The more serious-minded persons — those who wish to gain a well-balanced co-ordinated picture of the sciences and their industrial applications — are encouraged to visit the museum many times. An underlying purpose of the institution is the depiction of the Machine Age and the steps that led to that age. First, then, the serious-minded person (*Continued on page 274*)



Chicago Architectural Photographing Company

A flow chart showing the making and uses of malleable iron

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Charles E. Locke, '96, who becomes professor emeritus, will continue as alumni secretary.

Professors Emeriti

THIS year brings the retirement of eight members of the Faculty who have been closely associated with the growth of the Institute and whose influence as teachers will long be remembered by thousands of former students. They are Professor Charles E. Locke, '96, a member of the Institute's staff for forty years; Professor Charles E. Fuller, '92, who will be remembered by every student in the Department of Mechanical Engineering since 1892, when he joined the staff; Professor George Owen, '94, internationally known yacht designer, who joined the faculty of the Department of Naval Architecture and Marine Engineering in 1915; Professor Arthur A. Blanchard, '98, who came to the Department of Chemistry in 1899; Professor Ralph R. Lawrence, '95, who was appointed to the Department of Physics in 1896 and was transferred to the Department of Electrical Engineering in 1901; Professor Joseph C. Riley, '98, a member of the staff of the Department of Mechanical Engineering since 1898; Professor Archer T. Robinson, whose admirable qualities as a teacher have enriched the influence of the Department of English and History for many years; and Professor Edward E. Bugbee, '00, who, except for an interval between 1903 and 1907, has been a member of the staff of the Department of Mining and Metallurgy since 1900. All will retire with the rank of professor emeritus. Professor Locke and Professor Fuller have been appointed honorary lecturers in their Departments, and Professor Locke will also continue as secretary of the Alumni Association. The retirement of Professor Bugbee, who has been on leave of absence for the past year, will not become effective until next October, while Professor Riley will not retire until January.

Wherever mining engineers are found, from Alaska to the Andes and west to the African gold fields, Charlie Locke is known both as an admirable teacher and as an engineer who has contributed much to the knowledge of ore dressing, a field in which he was long associated with Professor Robert H. Richards, '68. Professor Locke became acting head of the Department of Mining Engineering upon the retirement of Professor W. Spencer Hutchinson, '92, in 1939 and joined the staff of the Department of Metallurgy last year when Mining was discontinued as a Course. Professor Locke's professional connection with the Institute began as an assistant to Professor Richards in the preparation of the latter's widely known textbook on ore dressing. He was appointed an instructor in 1901 and advanced to the rank of professor in 1930. During those fruitful years under the guidance of Professor Richards, he gradually took over the teaching burden in mining engineering and ore dressing. For years Professor Locke has made it a practice to travel during the summer months in order to keep in close touch with the practical operations of mining. There are few mines in the United States, Canada, and Newfoundland which have not been surveyed by his critical eye. His professional activities have in no sense exhausted his capacity for various other activities, for Charlie Locke is known to every Alumnus of the Institute as the energetic and very loyal secretary of the Alumni Association, a post to which he was appointed in 1930. He has been equally active in the affairs of the Class of 1896 and has been its Secretary for thirty-three years.

It is a pleasure to be able to announce that Professor Locke's association with the Institute does not end with his retirement. His appointment as honorary lecturer in the Department of Metallurgy and his continuing daily duties as secretary of the Alumni Association assure his colleagues of the stimulation of his presence with his constant companion, a colossal and historic pipe, which more than once has violated the standards of smoke-abatement engineers.

Professor Fuller has been dean of army students since 1933 and was for eighteen years in charge of the Testing Materials Laboratory. As chairman of the committee in charge of graduate courses in his Department, he has had much to do with the advanced studies in Mechanical Engineering. Professor Fuller has long been interested in the design and construction of ordnance and has

devoted part of his time to this specialized field of engineering. In 1923 he was commissioned colonel in the ordnance department of the Officers' Reserve Corps of the United States Army. As a technical author, Professor Fuller collaborated with his classmate W. A. Johnston in the preparation of a textbook on applied mechanics, and he has written many reports of investigations into mechanical engineering projects. During the past thirty years he has been actively interested in the development of the public utilities of the town of Wellesley, Mass., of which he has for many years been a resident.

Professor Owen, whose name as a designer of ships is known to every yachtsman in the country, began his career as a textile mill engineer, following his graduation from Technology in 1894. Later he became an inspector of ordnance, after having been associated with the Herreshoff Manufacturing Company in Rhode Island. In 1901, while serving as an engineer in a steel plant in Hamilton, Ontario, Professor Owen first found the opportunity to indulge his interest in boats. He then joined the engineering staff of the Fore River Shipbuilding Company and in 1907 began an independent career as shipbuilder and designer. In 1915 he was appointed to the Faculty of the Institute as an assistant professor. During his career he has designed a number of famous racing yachts and has done notable work as well in the field of merchant ship design. In his teaching Professor Owen has translated and passed on to his many students not only the formal knowledge of naval architecture but a rich store of information gathered in many years of experience in seamanship and the operation of vessels of various types.

Professor Blanchard is distinguished not only as a very able teacher but as an eminent research worker and author of several important technical books. He bears the name of one of New England's oldest families, is a native of Boston, and began his education in the schools of Newton, from which he came to Technology. Upon his graduation in 1898 he became an assistant in the Department of Chemistry, an association which was interrupted two years later when he was awarded a fellowship for study at the University of Leipzig, where he was awarded the degree of doctor of philosophy in 1902. Returning to this country, he served for a time as an instructor at New Hampshire College, now the University of New Hampshire, before rejoining the staff of the Institute. His broad interests in research have included investigation of migration ratios, the decomposition of ammonium nitrate, the viscosity of solutions in relation to the constitution of dissolved substances, atomic structure and valence, and the carbonyls of metals. In collaboration with Professor Joseph W. Phelan, '94, Dr. Blanchard wrote *Synthetic Inorganic Chemistry* and also he was joint author with Frank B. Wade of a textbook, *Foundations of Chemistry*. Another work in which he collaborated was *The Electrolytic Dissociation Theory*, written with Henry P. Talbot.

Professor Lawrence, a brother of William H. Lawrence, '91, Professor Emeritus of Architectural Engineering, is an authority on alternating current and alternating current machinery and is the author of two textbooks, *Principles of Alternating Current Machinery* and *Principles of Alternating Currents*. After he was graduated as an electrical engineer in 1895, Professor Lawrence joined the Department of Physics as an assistant and two years later was appointed an instructor. In 1901 he was transferred to the Department of Electrical Engineering, in which he has served ever since. He has been active in the leading engineering societies, and he is a fellow of the American Institute of Electrical Engineers, a member of the American Academy of Arts and Sciences, the Society of American Military Engineers, the Illuminating Engineering Society, and the Society for the Promotion of Engineering Education.

Professor Riley, who, during the World War, served as a major in the Air Service, has been a member of the staff of the Institute since his graduation in 1898. Beginning as an assistant, he advanced in subsequent promotions to the rank of professor of heat engineering in 1920.

Professor Robinson, who joined the Department of English in 1896 and has long been in charge of its courses in history, was educated at Phillips Academy, Andover, and at Harvard University, where he was awarded his bachelor's degree in arts in 1896 and his master's degree in 1915. As a student of European history, he has traveled widely and done much careful research to enrich the substance of his well-remembered courses. As chairman of the Cilley Fund, established to provide books for the Cilley Library in Walker Memorial, Professor Robinson has been influential in increasing the range of the library both for recreational reading and as a fruitful source of material for courses in his Department. He is the author of *Applications of Logic*, published in 1912, and of *Notes and Outlines*, in 1922.

Professor Bugbee is well known as an authority on fire assaying. A native of Brookline, Mass., he was educated in the public schools there and was graduated from the Institute in 1900. In addition to his teaching experience at Technology, he also served as an assistant professor of mining and metallurgy at Iowa State College, as well as at the University of Washington, from which he returned to the Institute. During 1901–1902 he was on the technical staff of the Brookfield Mining Company and later was an assistant metallurgist for the United States Geological Survey. During 1918 he served as assistant educational director of the committee on education and special training for the United States War Department. He is the author of *A Textbook of Fire Assaying* and is a member of the American Institute of Mining and Metallurgical Engineers, Sigma Xi, and Beta Theta Pi.

Promotions and Appointments

APPOINTMENT of Sverre Petterssen to head the new Department of Meteorology is announced in the Institute's list of staff promotions and appointments for the next academic year. Also announced is the appointment of two new members to the faculty of the Department of Biology and Public Health. Dr. Petterssen, who since 1939 has been acting head of the Course in Meteorology, which now becomes a separate Department, will succeed Professor Carl-G. A. Rossby, who has been on an extended leave of absence to be assistant chief of the United States Weather Bureau, in

Courtesy of the Christian Science Monitor

Training in the engineering aspects of war as part of the nation's defense program is being given to some 900 young men in four of Greater Boston's colleges. Much work is done at the Institute, where this photograph shows (left to right) three members of the special defense staff: George Eggleston, assistant in naval architecture; Jere R. Daniell, '97, supervisor of naval architecture and marine engineering; and Raymond E. Keyes, '40, assistant in marine engineering; with two members of the Institute Faculty: Raymond D. Douglass, '31, Professor of Mathematics; and Arthur L. Townsend, '13, Associate Professor of Mechanical Engineering. Professors Douglass and Townsend are associated with the Engineering Defense Training Bureau of Metropolitan Boston, with headquarters at Technology. Edward L. Moreland, '07, Dean of Engineering at the Institute, is regional adviser.

charge of research. Professor Rossby will resign to join the faculty of the University of Chicago.

Faculty members promoted to the rank of professor include Hoyt C. Hottel, '24, Thomas K. Sherwood, '24, and Harold C. Weber, '18, all of the Department of Chemical Engineering; Ernest H. Huntress, '20, Department of Chemistry; and Julius A. Stratton, '23, Department of Physics.

Members of the Faculty advanced to the rank of associate professor are Samuel C. Collins, Arthur R. Davis, Gerhard Dietrichson, Robert C. Hockett, Nicholas A. Milas, and Charles M. Wareham, '16, all of the Department of Chemistry; and Robert S. Harris, '28, and Marshall W. Jennison, '27, of the Department of Biology and Public Health.

Appointed to the rank of assistant professor are Joseph A. Bergantz, '39, Department of Chemical Engineering; Alfred H. Clifford, Department of Mathematics; Lyman M. Dawes, '23, Arthur E. Fitzgerald, '31, and James E. Mulligan, '33, Department of Electrical Engineering; Albert G. Dietz, '32, Department of Building Engineering and Construction; John A. Hrones, '34, Department of Mechanical Engineering; Walter McKay, '34, of the Department of Aeronautical Engineering; Charles A. Myers, Department of Economics and Social Science; Charles H. Norris, '32, and Herman J. Shea, '33, of the Department of Civil Engineering; and Walter F. Urbach, of the Department of English and History.

Appointments to the grade of instructor include those of Walter K. Bodger, '40, Louis F. Coffin, Jr., Kenneth R. Fox, '40, and Frank J. Mehringer, Department of Mechanical Engineering: and Robert Plunkett, '39, Department of Electrical Engineering.

The two new members of the faculty of the Department of Biology and Public Health, both of whom will be active in the Institute's program in biological engineering, are Richard S. Bear of the department of chemistry of Iowa State College, and David Floyd Waugh of the department of zoology of Washington University in St. Louis. Dr. Bear, who is thirty-two years old and a native of Miamisburg, Ohio, was graduated from Princeton University in 1930 with the degree of bachelor of science. His graduate work was carried on at the University of California, where in 1933 he was awarded the doctorate in philosophy. He then returned to Princeton as a National Research Council Fellow in Chemistry for a year of postdoctorate study. His professional experience includes four years in the zoology department of Washington University, during which time he specialized in the application of physical and chemical methods in the study of nerve structure and physiology. Since 1938 he has been assistant professor in the plant chemistry subsection of the department of chemistry at Iowa State College.

Mr. Waugh is a native of St. Louis and began his early education in England, coming later to St. Joseph Junior College, which he entered in 1931. He studied at Washington University during 1932–1933, at the University of Missouri the following year, and returned in 1934 to Washington University, where he will have completed his work for the degree of doctor of philosophy in June. He was an assistant in zoology from 1936 to 1938 and has been an instructor there since 1939. During the summer of that year he was research assistant to Irving Langmuir in the research laboratories of the General Electric Company. Dr. Bear and Mr. Waugh will begin their work at the Institute next September.

Before coming to the Institute from Norway, of which country he is a native, Dr. Petterssen, the new Head of the Institute's Department of Meteorology, was for seven years in charge of the Weather Forecasting Institute in Bergen, a position to which he was appointed after long experience as a meteorologist in the Norwegian Weather Forecasting Service. Joining the staff as an associate professor in 1939, he was promoted to professor last year.

Dr. Petterssen was graduated from Oslo University with the degree of master of science in 1926 and was awarded his doctorate in science in 1933. He has been a visiting lecturer and instructor at the United States Navy bases in Norfolk and San Diego, as well as at the California Institute of Technology, the United States Weather Bureau in Washington, and the Meteorological Office in Toronto, Canada. He is internationally known as an authority on meteorology and forecasting (subject of his article in this issue of The Review), having developed several methods for quantitative forecasting based on the movement of air fronts, air masses, and low-pressure centers. He has had an important part in guiding the work of his staff in a co-operative research program with the United States Weather Bureau.

Allyne L. Merrill, 1864–1941

ALLYNE L. MERRILL, '85, Professor Emeritus of Mechanism, who was a member of Technology's instructing staff for nearly half a century and secretary of the Faculty for twenty-eight years prior to his retirement in 1934, died in Portland, Maine, on February 26.

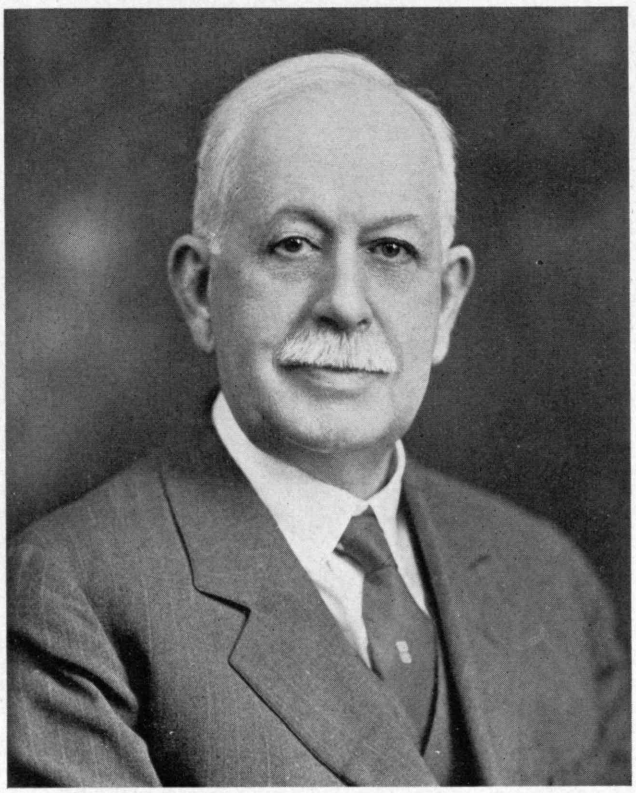
Professor Merrill was born in Malden, Mass., in 1864, the son of George S. and Myra H. Litchfield Merrill. He became an assistant in the mechanical engineering laboratories of the Institute in 1885 and was promoted to the grade of instructor in mechanical engineering in 1887. He was made an assistant professor in 1891, associate professor in 1899, and full professor in 1905. In 1906 he was elected secretary of the Faculty. He was the author of *Elements of Mechanism*, published in 1904.

Professor Merrill's popularity among his associates at the Institute was demonstrated at the time of the announcement of his retirement, when nearly 200 of the Faculty attended a luncheon in his honor.

Boston Alumni Meeting

INSTITUTE Alumni of Greater Boston held their second annual midwinter dinner meeting in Walker Memorial on February 27. Nearly 400 Technology men heard Dr. Compton report on the Institute's active co-operation in the national defense program, through research, through special training courses, and through co-operation of members of the staff with various governmental agencies in Washington. Thus the Institute is performing a broad public service, the significance of which is indicated by the fact that its admirable resources in science and engineering are being applied efficiently in the interest of national welfare.

A. Warren Norton, '21, Vice-President of the Alumni Association, presided at the meeting and presented the guest speaker, Reuben H. Markham of the *Christian Science Monitor*, who drew upon his experience of twenty-five years as correspondent in southeastern Europe for an address on "Hitler in the Balkans." Mr. Markham devoted himself to an interpretation of the history of the Balkans through the centuries as a background for understanding the present unrest in that region. Horace S. Ford, the Institute's Treasurer, presented a new motion picture in color of Technology in action, including interesting scenes of undergraduate life. Among these scenes are views of the new Alumni Pool, crew practice, a fencing match, track, and other sports.



Allyne L. Merrill

The committee in charge of the meeting included Francis A. Barrett, '24, of Winchester, chairman; Larcom Randall, '21, Wellesley; C. Yardley Chittick, '22, Waban; James Donovan, '28, Cambridge; and Parker H. Starratt, '30, Hingham.

Cheering Chesterman

SPEAKING from Boston over a long-distance telephone broadcasting circuit, President Compton on February 25 addressed a farewell luncheon given in Pittsburgh in honor of Francis J. Chesterman, '05, life member of the Corporation, who recently was appointed vice-president in charge of operations of the Bell Telephone Company of Pennsylvania in Philadelphia.

Leaving a meeting of the executive committee of the Corporation, Dr. Compton spoke from the Union Club in Boston, paying tribute to Mr. Chesterman, whose loyalty to the Institute is known wherever Technology men gather. A large group of members of the M.I.T.

Club of Western Pennsylvania heard Dr. Compton's message, which follows:

Though members of a democracy one of whose basic tenets is that "all men are created equal," we are today honoring a man because we recognize him as a nobleman in our midst. Frank Chesterman is a nobleman, not because he happened to be born with a title or because he was a favorite of some king, but because he has true nobility of character; because his stature is high in those qualities of ability, loyalty, generosity, and humility which are more important than wealth or title; and because he unconsciously devotes his thoughts and energies to good causes for the help of others and not to his own self-interests.

You who have lived with him have seen more evidence of these qualities than I have, simply because has spent more days of the year in Pittsburgh than in Cambridge. But with a man of Frank Chesterman's caliber one does not have to be with him long to form a true judgment. Early in my connection with the Institute I learned of the respect and affection with which he was regarded by his 1905 classmates and by the members of the M.I.T. Club of Western Pennsylvania. I learned the reason for this respect and affection as I saw him in action during his five years of very loyal service as an elected alumni member of our Corporation — a service so helpful to his alma mater that he was elected a life member in 1938.

While speaking of M.I.T., let me interject a message of greeting to the many Alumni who I know are present at this farewell luncheon. This occasion, which marks Mr. Chesterman's loss from your group, has one consolation for me — Frank Chesterman in Philadelphia will be quite a bit closer to Cambridge than was Frank Chesterman in Pittsburgh and yet not too far away from you to sever completely the close contacts which you and he have built up over so many years.

Frank Chesterman, I thank you for the ways in which you have helped me in my job here, through wise counsel, through loyal support, and through real work on departmental Visiting Committees as occasion demanded. I congratulate you on your appointment to a post of still greater responsibility in that great company which you serve, whose guiding principle has always been to give the best possible service to the public, just as you give personal service to your community.

Charles A. Stone, 1867–1941

IN the death of Charles A. Stone, '88, in New York on February 25, the Institute lost not only a life member of its Corporation but also one of its most generous benefactors. A year after his graduation, Mr. Stone formed what was to become a lifelong partnership with his classmate Edwin S. Webster. At the time of his death Mr. Stone was chairman of the board of Stone and Webster, Inc., which, over the past half century, has become one of the country's outstanding engineering firms, builder of the greater Technology in Cambridge.

Mr. Stone was born in Newton in 1867, the son of Charles H. and Mary Augusta Green Stone. After he was graduated from Technology, Mr. Stone took a position in the research laboratories of the Thomson Electrical Welding Company, forerunner of the General Electric Company. In 1889 he formed the partnership with Mr. Webster, under the name of the Massachusetts Electrical Engineering Company, Stone and Webster, managers. In 1890 the firm was given its first engineering and construction contract for the erection of Pioneer Saccarappa, a hydroelectric installation and transmission line in Maine. This development was one of the first to demonstrate the commercial possibilities of electrical transmission of power, and upon its successful completion the young firm began to expand, contributing importantly to the growth of public utilities throughout the country. Later the company was called upon as consultant on the operation of many electric-light and power plants, as well as electric railways, an activity which led it into the field of management and investment banking. When the need for ships became very urgent during the first World War, Mr. Stone's firm undertook construction of the famous fifty-way shipyard at Hog Island as an assembly plant for parts manufactured in various sections of the country.

The testing floor of the Sloan Laboratories

M.I.T. Photo

Undergraduates to Graduates

CONDUCT of undergraduate activities at the Institute was detailed for members of the Alumni Council at their 218th meeting, in Pritchett Hall on the last Monday in February, by thirteen undergraduate speakers, representatives of the student governing body and of the major activity groups. Their presentations, which were concise but comprehensive, indicated that the distinguished record of undergraduate control of, and responsibility for, undergraduate affairs at Technology is being well maintained by the present generation of students.

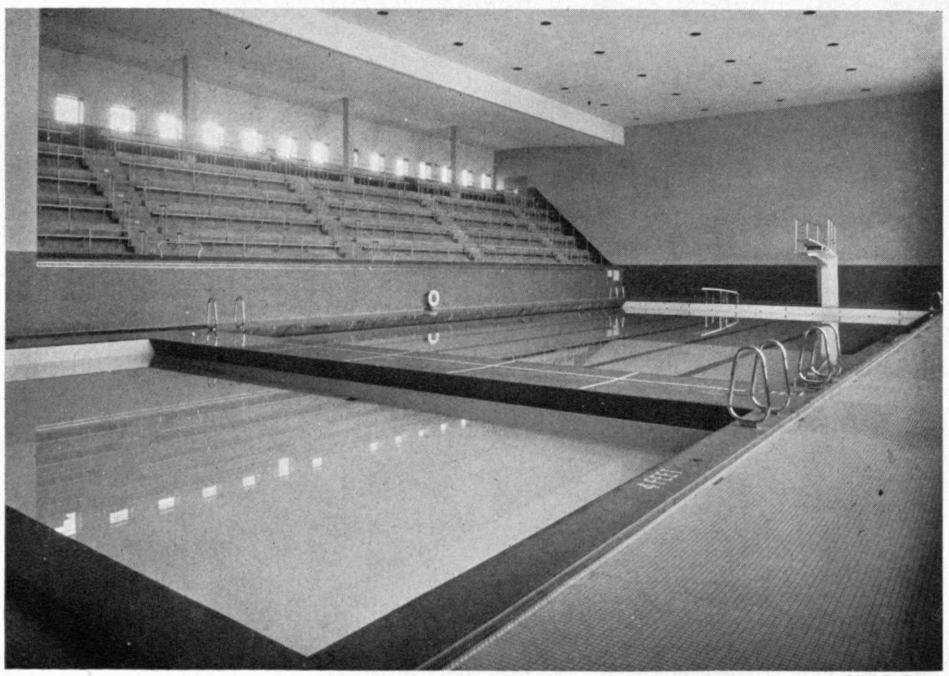
Presiding officer in the absence of Henry E. Worcester, '97, President of the Alumni Association, was A. Warren Norton, '21, Vice-President. He introduced Dr. Compton, who discussed briefly the problem of speeding up education to meet the extra demand for engineers and scientists, a demand imposed by the nation's defense program. The proposal that courses be re-arranged to provide for graduation in three instead of four years has disadvantages outweighing its advantages, from the Institute's point of view, he declared. Reports from committees and officers followed.

John B. Murdock, '41, of Tempe, Ariz., President of the senior class and of the Institute Committee, was then introduced as chairman of the undergraduate program. Expressing appreciation of the opportunity, Mr. Murdock presented as speakers William M. Folberth, Jr., '41, of Cleveland, Ohio, chairman of the budget committee, who discussed problems of allocating money to the activities; Joseph H. Myers, '41, of Evanston, Ill., who spoke for the Athletic Association, describing the job of handling twenty varieties of sports; William R. Ahrendt, '41, of Westfield, N. J., chairman of the Walker Memorial committee, who told of the responsibility of assignment of space and arrangements for gatherings; Willard S. Mott, '41, of Bridgeport, Conn., chairman of the dormitory committee, who outlined the conduct of dormitory affairs; Warren J. Meyers, '41, of Winnetka, Ill., general manager of volume XXI of the *Tech Engineering News*, James S. Thornton, '41, of Summit, N. J., general manager of "Technique" for 1941, Robert S. Shaw, '42, of Newton, Mass., general manager of volume XXIV of *Voo Doo*, and Harold E. Dato, '41, of Chicago, Ill., general manager of volume LX of *The Tech*, who discussed their respective publications; Wilfred H. Shaw, '42, of Rochester, N. Y., who described the activities of the Technology Christian Association; Walter S. Eberhard, '42, of Waltham, Mass., who spoke for the 5:15 Club; Rogers B. Finch, '41, of Broadalbin, N. Y., who, as general manager, presented the operation of the Musical Clubs; and Arnold S. Mengel, '41, of St. Louis, Mo., chairman of the student-faculty committee, who explained the duties and activities of that organization.

The student presentations were run off according to a strict schedule which involved the presence of a timing clock set to limit each speaker to five minutes. The talks were well received.

The complete roster of subcommittees for Alumni Day 1941 was presented as follows: *Class Day*, John D. Mitsch, '20, chairman, Henry A. Fiske, '91, James A. Burbank, '16, Eugene Mirabelli, '19; *dinner*, Raymond H. Blanchard, '17, chairman, Arthur L. Shaw, '09, Warren E. Glancy, '13, Josiah D. Crosby, '21, Delbert W. Kendall, '24, Herbert R. Stewart, '24; *exhibits*, John G. Trump, '33, chairman, J. Warren Horton, '14, Francis J. Safford, '34, Robert W. Cloud, '37, Robert J. van de Graaff, Robley D. Evans, George G. Harvey, M. Stanley Livingston, Arthur C. Watson, and Arthur Roberts, Staff; *ladies' events*, Mrs. Leicester F. Hamilton, chairman, Mrs. Howard R. Bartlett, Mrs. Arthur A. Blanchard, Mrs. Raymond H. Blanchard, Mrs. Karl T. Compton, Mrs. Horace S. Ford, Mrs. Carle R. Hayward, Mrs. Ralph T. Jope, Mrs. Henry B. Shepard, Mrs. Stephen G. Simpson, Mrs. Richard Whiting, Mrs. Henry E. Worcester; *luncheon*, Kenneth C. Reynolds, '25, chairman, James Holt, '19, Bernard E. Proctor, '23, Herbert L. Beckwith, '26, Howard R. Staley, '35; *publicity and promotion*, Ralph T. Jope, '28, chairman, Henry B. Kane, '24, James Donovan, '28, Frederick G. Fassett, Jr., John J. Rowlands, Staff; *registration*, Donald P. Severance, '38, chairman, Joseph C. MacKinnon, '13, Robert M. Kimball, '33, Wolcott A. Hokanson, Staff; *ways and means*, Horace S. Ford, Staff, chairman, Albert V. Smith, '20, Delbert L. Rhind, Staff; *twenty-five years in Cambridge*, James R. Killian, Jr., '26, chairman, Alf K. Berle, '27; *symposium*, Edward R. Schwarz, '23, chairman, and entire committee.

Economic aspects of the European situation were the subject of a panel discussion at the 217th meeting of the Council, that for January. Speakers were Ralph E. Freeman, Head of the Department of Economics and Social Science, who discussed broad aspects of procurement and mobilization; Roland D. Parks, Assistant Professor of Mineral Industry in the Department of Geology, who analyzed the mineral resources of Europe with regard to the present struggle; and Samuel C. Prescott, '94, Dean of Science, who considered the food situation.



M.I.T. Photo

Placid while being photographed, the Alumni Pool has been actively used during the present school year.

WARS AND WEATHER

(*Continued from page 249*)

kinetic energy and vice versa, but the unstable waves on the polar front utilize the available energy to a high degree. The intensity with which storms develop will therefore depend on the amount of available energy and the degree of dynamic instability.

Life History of Air Masses. Although the most severe weather occurs in connection with fronts, numerous weather phenomena develop within traveling air masses. Here, again, stability or instability is the deciding factor.

An air mass that is colder than the surface over which it travels is called a "cold air mass." Through heat from the underlying surface, the stratification becomes unstable: Bodies of air from the surface rise, while air from aloft sinks to replace the ascending masses. The result is a broken and variable sky of cumuli, often accompanied by showers and, in pronounced conditions, by squalls, hail, and thunderstorms, depending on the degree of instability.

An air mass that is warmer than the surface over which it travels is called a "warm air mass." Continued cooling from below results in the condensation of water vapor at low levels; stratus, fog, and drizzle are the typical accompanying weather phenomena.

The weather analyst is much concerned with the life history of traveling air masses because on it depends the type of weather that is to be expected. Significant factors are whether an air mass originally came from a polar or tropical source, whether it has traveled over ocean or over land, and how long it has been in contact with the various types of underlying surfaces. Identification of air masses from day to day and construction of their trajectories are problems which must be solved before forecasts are made.

Near the earth's surface the problem of identification is reasonably simple, because air currents follow the earth's surface. In the free atmosphere the problem is not so readily solved. There the air masses ascend and descend and hence they will not remain within weather maps drawn for any fixed levels. To identify the air masses in the free atmosphere, it is necessary to determine the bulging sheets within which the air streams; within each such sheet, the individual masses can be identified by means of some physical property which is conservative.

Although the air masses near the earth's surface are subject to nonadiabatic processes, the changes in the air masses at high levels are mainly adiabatic. A body of air in the free atmosphere will therefore tend to preserve its entropy. On this principle, C.-G. A. Rossby and his collaborators at Technology developed a method of analysis, called "isentropic analysis," which consists in drawing weather maps not for constant levels but for surfaces of constant entropy. Within such an isentropic chart, the individual masses are identified by their specific humidity, which remains constant as long as condensation does not occur.

By means of surface weather charts, isentropic charts, and a number of other types of maps, the forecaster obtains a picture of the state of the atmosphere at successive intervals. If the observations are sufficient in number and cover a large enough area, he can compute future displacements and developments. But regardless of whether the observational basis is sufficient, he has to face the public several times a day and predict, with conviction, what the atmosphere is going to do.

World War II and Long-Range Forecasting. The rapid development of aviation has greatly increased the demand for accurate weather forecasts. In peacetime, aviation is concerned mostly with short-term forecasts for individual trips. In wartime, the major problem is to forecast sufficiently long periods of favorable weather to permit major operations which require several days of preparation. In warfare, a good start is often more than half a victory.

The German invasion of Poland is generally believed to have been successfully timed to coincide with a period of dry weather which robbed the Poles of the assistance of General Mud. The invasion of the Netherlands is believed to have been equally well timed with a major weather period. What is good weather for one purpose may be bad weather for others. For instance, the invasion of Norway, where the polar front theory originated, coincided with a period of real polar front weather. To conclude that this coincidence was due to bad luck or lack of planning would be erroneous. Since the major ports in Norway were undefended, they were the targets at which the invader aimed, and he could therefore use large ships, which could operate in rough weather. To conceal the movement from the British fleet, several days of bad visibility would be just the type of weather desired by the invader.

The much talked-of invasion of the British Isles could hardly be successful if attempted in large ships aiming at the major ports but might well be attempted in small ships, tugs, and barges aiming at unfortified places. For such operations a period with reasonably calm sea, bad visibility at sea, and favorable flying weather over land would be ideal. This combination, extremely rare in fall and winter, is not infrequent in April and May, when a maximum of fog frequency occurs over the North Sea (which then is quite calm) and the visibility over the British Isles is usually good. Considering the tremendous stakes, it might be worth while to wait three seasons for this combination. No wonder, then, that the lords of World War II have turned their attention to long-range forecasting.

A utopian dream for many years, long-range forecasting will probably be one of the useful by-products of the present war. In Germany an institute organized particularly for such forecasting has studied the problem for many years and has probably rendered valuable service during the present crisis. Not only are forecasts made for the trend of the weather a week or two in advance but also for longer trends, such as crop forecasting and so on.

In the United States, considerable research also is in progress. Technology, in collaboration with the United States Weather Bureau, the Department of Agriculture, the Navy, and the Air Corps, has attacked the problem along lines suggested by Dr. Rossby, with results so encouraging that the project is about to be organized on a service basis. (*Concluded on page 266*)

WARS AND WEATHER

(*Concluded from page 265*)

This success does not mean, however, that the problem has been solved in all details. Many negative and a few positive results have been obtained; many more results, of both categories, will follow. At the present moment it seems safe to say that the problem has a solution and to forecast that the solution will be found.

LANGUAGES AND LOGIC

(*Continued from page 252*)

to communicate with their fellows tend to be learned versions of the same method and, while interesting, still evade the question. In similar case is evasion of the question by skipping from the speech sentence, via physiology and "stimuli," to the social situation.

The *why* of understanding may remain for a long time mysterious; but the *how* or logic of understanding — its background of laws or regularities — is discoverable. It is the grammatical background of our mother tongue, which includes not only our way of constructing propositions but the way we dissect nature and break up the flux of experience into objects and entities to construct propositions about. This fact is important for science because it means that science *can* have a rational or logical basis even though it be a relativistic one and not Mr. Everyman's natural logic. Although it may vary with each tongue, and a planetary mapping of the dimensions of such variation may be necessitated, it is, nevertheless, a basis of logic with discoverable laws. Science is not compelled to see its thinking and reasoning procedures turned into processes merely subservient to social adjustments and emotional drives.

Moreover, the tremendous importance of language cannot, in my opinion, be taken to mean necessarily that nothing is back of it of the nature of what has traditionally been called "mind." My own studies suggest, to me, that language, for all of its kingly role, is in some sense a superficial embroidery upon deeper processes of consciousness which are necessary before any communication, signaling, or symbolism whatsoever can occur and which also can at a pinch effect communication (though not true *agreement*) without language's and without symbolism's aid. I mean "superficial" in the sense that all processes of chemistry, for example, can be said to be superficial upon the deeper layer of physical existence, which we know variously as intra-atomic, electronic, or subelectronic. No one would take this statement to mean that chemistry is *unimportant* — indeed the whole point is that the more superficial can mean the more important, in a definite operative sense. It may even be in the cards that there is no such thing as "Language" (with a capital *L*) at all! The statement that "thinking is a matter of *language*" is an incorrect generalization of the more nearly correct idea that "thinking is a matter of *different tongues*." The different tongues are the real phenomena and may generalize down not to any such universal as "Language," but to something better — called "sublinguistic" or "superlinguistic" — and *not altogether* unlike, even if much unlike, what we now call "mental." This generalization would not diminish, but would rather increase, the importance of intertongue study for investigation of this realm of truth.

Botanists and zoologists, in order to understand the world of living species, found it necessary to describe the species in every part of the globe and to add a time perspective by including the fossils. Then they found it necessary to compare and contrast the species, to work out families and classes, evolutionary descent, morphology, and taxonomy. In linguistic science a similar attempt is under way. The far-off event toward which this attempt moves is a new technology of language and thought. Much progress has been made in classifying the languages of earth into genetic families, each having descent from a single precursor, and in tracing such developments through time. The result is called "comparative linguistics." Of even greater importance for the future technology of thought is what might be called "contrastive linguistics." This plots the outstanding differences between tongues — in grammar, logic, and general analysis of experience.

As I said in the April, 1940, Review, segmentation of nature is an aspect of grammar — one as yet little studied by grammarians. We cut up and organize the spread and flow of events as we do largely because, through our mother tongue, we are parties to an agreement to do so, not because nature itself is segmented in exactly that way for all to see. Languages differ not only in how they build their sentences but in how they break down nature to secure the elements to put in those sentences. This breakdown gives units of the lexicon. "Word" is not a very good "word" for them; "lexeme" has been suggested, and "term" will do for the present. By these more or less distinct terms we ascribe a semifictitious isolation to parts of experience. English terms, like "sky," "hill," "swamp," persuade us to regard some elusive aspect of nature's endless variety as a distinct *thing*, almost like a table or chair. Thus English and similar tongues lead us to think of the universe as a collection of rather distinct objects and events corresponding to words. Indeed this is the implicit picture of classical physics and astronomy — that the universe is essentially a collection of detached objects of different sizes.

The examples used by older logicians in dealing with this point are usually unfortunately chosen. They tend to pick out tables and chairs and apples on tables as test objects to demonstrate the objectlike nature of reality and its one-to-one correspondence with logic. Man's artifacts and the agricultural products he severs from living plants have a unique degree of isolation; we may expect that languages will have fairly isolated terms for them. The real question is: What do different languages do, not with these artificially isolated objects but with the flowing face of nature in its motion, color, and changing form; with clouds, beaches, and yonder flight of birds? For as goes our segmentation of the face of nature, so goes our physics of the cosmos.

Here we find differences in segmentation and selection of basic terms. We might isolate something in nature by saying, "It is a dripping spring." Apache erects the statement on a verb *ga:* (*Continued on page 268*)

LANGUAGES AND LOGIC

(*Continued from page 266*)

"be white (including clear, uncolored, and so on)." With a prefix *nō-* the meaning of downward motion enters: "whiteness moves downward." Then *tó*, meaning both "water" and "spring," is prefixed. The result corresponds to our "dripping spring," but synthetically it is: "as water, or springs, whiteness moves downward." How utterly unlike our way of thinking! The same verb, *ga*, with a prefix that means "a place manifests the condition" becomes *gohlga:* "the place is white, clear; a clearing, a plain." These examples show that some languages have means of expression — chemical combination, as I called it — in which the separate terms are not as separate as in English but flow together into plastic synthetic creations. Hence such languages, which do not paint the separate-object picture of the universe to the same degree as do English and its sister tongues, point toward possible new types of logic and possible new cosmical pictures.

The Indo-European languages and many others give great prominence to a type of sentence having two parts, each part built around a class of word — substantives and verbs — which those languages treat differently in grammar. As I showed in the April, 1940, Review, this distinction is not drawn from nature; it is just a result of the fact that every tongue must have some kind of structure, and those tongues have made a go of exploiting this kind. The Greeks, especially Aristotle, built up this contrast and made it a law of reason. Since then, the contrast has been stated in logic in many different ways: subject and predicate, actor and action, things and relations between things, objects and their attributes, quantities and operations. And, pursuant again to grammar, the notion became ingrained that one of these classes of entities can exist in its own right but that the verb class cannot exist without an entity of the other class, the "thing" class, as a peg to hang on. "Embodiment is necessary," the watchword of this ideology, is seldom *strongly* questioned. Yet the whole trend of modern physics, with its emphasis on "the field," is an implicit questioning of the ideology. This contrast crops out in our mathematics as two kinds of symbols — the kind like 1, 2, 3, x, y, z and the kind like $+$, $-$, $\div$, $\sqrt{\ }$, log — though in view of 0, $\frac{1}{2}$, $\frac{3}{4}$, π, and others, perhaps no strict two-group classification holds. The two-group notion, however, is always present at the back of the thinking, although often not overtly expressed.

Our Indian languages show that with a suitable grammar we may have intelligent sentences that cannot be broken into subjects and predicates. Any attempted breakup is a breakup of some English translation or paraphrase of the sentence, not of the Indian sentence itself. We might as well try to decompose a certain synthetic resin into celluloid and whiting because the resin can be imitated with celluloid and whiting. The Algonquian language family, to which Shawnee belongs, does use a type of sentence like our subject and predicate but also gives prominence to the type shown by our examples in the text and in Fig. 1. To be sure, *ni-* is represented by a subject in (*Continued on page 270*)

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LANGUAGES AND LOGIC

(*Continued from page 268*)

the translation but means "my" as well as "I" and the sentence could be translated thus: "My hand is pulling the branch aside." Or *ni-* might be absent; if so, we should be apt to manufacture a subject, like "he," "it," "somebody," or we could pick out for our English subject an idea corresponding to any one of the Shawnee elements.

When we come to Nootka, the sentence without subject or predicate is the only type. The term "predication" is used, but it means "sentence." Nootka has no parts of speech; the simplest utterance is a sentence, treating of some event or event-complex. Long sentences are sentences of sentences (complex sentences), not just sentences of words. In Fig. 2 we have a simple, not a complex, Nootka sentence. The translation, "he invites people to a feast," splits into subject and predicate. Not so the native sentence. It begins with the event of boiling or cooking, *tl'imsh;* then comes *-ya* ("result") = cooked; then *-'is* ("eating") = eating cooked food; then *-ita* ("those who do") = eaters of cooked food; then *-'itl* ("going for"); then *-ma*, sign of third-person indicative, giving *tl'imshya'isita'itlma*, which answers to the crude paraphrase, "he, or somebody, goes for (invites) eaters of cooked food."

The English technique of talking depends on the contrast of two artificial classes, substantives and verbs, and on the bipartitioned ideology of nature already discussed. Our normal sentence, unless imperative, must have some substantive before its verb, a requirement which corresponds to the philosophical and also naïve notion of an actor who produces an action. This last might not have been so if English had had thousands of verbs like "hold," denoting positions. But most of our verbs follow a type of segmentation that isolates from nature what we call "actions," that is, moving outlines.

Following majority rule, we therefore read action into every sentence, even into "I hold it." A moment's reflection will show that "hold" is no action but a state of relative positions. Yet we think of it and even see it as an action because language formulates it in the same way as it formulates more numerous expressions, like "I strike it," which deal with movements and changes.

We are constantly reading into nature fictional acting-entities, simply because our verbs must have substantives in front of them. We have to say "It flashed" or "A light flashed," setting up an actor, "*it*" or "light," to perform what we call an action, "to flash." Yet the flashing and the light are one and the same! The Hopi language reports the flash with a simple verb, *rehpi:* "flash (occurred)." There is no division into subject and predicate, not even a suffix like *-t* of Latin *tona-t* ("it thunders"). Hopi can and does have verbs without subjects, a fact which may give that tongue potentialities, probably never to be developed, as a logical system for understanding some aspects of the universe. Undoubtedly modern science, strongly reflecting western Indo-European tongues, often does as we all do, sees actions and forces where it sometimes might be better to see states. On the other hand, "state" is a noun, and as such it enjoys the superior (*Concluded on page 272*)

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(*Concluded from page 270*)

prestige traditionally attaching to the subject or thing class; therefore science is exceedingly ready to speak of states if permitted to manipulate the concept like a noun. Perhaps, in place of the "states" of an atom or a dividing cell, it would be better if we could manipulate as readily a more verblike concept but without the concealed premises of actor and action.

I can sympathize with those who say, "Put it into plain, simple English," especially when they protest against the empty formalism of loading discourse with pseudolearned words. But to restrict thinking to the patterns merely of English, and especially to those patterns which represent the acme of plainness in English, is to lose a power of thought which, once lost, can never be regained. It is the "plainest" English which contains the greatest number of unconscious assumptions about nature. This is the trouble with schemes like Basic English, in which an eviscerated British English, with its concealed premises working harder than ever, is to be fobbed off on an unsuspecting world as the substance of pure Reason itself. We handle even our plain English with much greater effect if we direct it from the vantage point of a multilingual awareness. For this reason I believe that those who envision a future world speaking only one tongue, whether English, German, Russian, or any other, hold a misguided ideal and would do the evolution of the human mind the greatest disservice. Western culture has made, through language, a provisional analysis of reality and, without correctives, holds resolutely to that analysis as final. The only correctives lie in all those other tongues which by aeons of independent evolution have arrived at different, but equally logical, provisional analyses.

In a valuable paper on "Modern Logic and the Task of the Natural Sciences," Harold N. Lee says: "Those sciences whose data are subject to quantitative measurement have been most successfully developed because we know so little about order systems other than those exemplified in mathematics. We can say with certainty, however, that there are other kinds, for the advance of logic in the last half century has clearly indicated it. We may look for advances in many lines in sciences at present well founded if the advance of logic furnishes adequate knowledge of other order types. We may also look for many subjects of inquiry whose methods are not strictly scientific at the present time to become so when new order systems are available." * To which may be added that an important field for the working out of new order systems, akin to, yet not identical with, present mathematics, lies in more penetrating investigation than has yet been made of languages remote in type from our own.

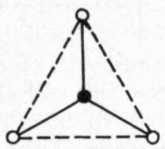
* *Sigma Xi Quarterly*, XXVIII (Autumn, 1940), 125.

GLASSY GEOMETRY

(*Continued from page 255*)

The second problem which the research at Technology has shown to be answerable in terms of the geometry of atomic arrangement within glass is that presented by the odd properties of glass made from boric oxide, soda, and silica. Direct practical bearing of considerable importance is in this aspect of the research, for the properties of such glass are already being utilized.

Boric oxide by itself readily forms a glass, in which x-ray results indicate that each boron atom is triangularly bonded to three oxygens, thus:



Each oxygen is bonded to a second boron in an adjoining group. When the batch consists of silica and boric oxide, the expansion coefficient of the glass is less than that of the straight boric-oxide product, for each silicon is bonded to the surrounding structure in four directions (as in the soda-silica glass described earlier), whereas the borons bond in only three directions. If boron atoms can be made to shift from their natural triangular bonding to the tetrahedral bonding which the silicon atoms naturally assume, the expansion coefficient of a boron glass might naturally drop.

Here is where the "boric-oxide anomaly" operates. When a glass batch consists of boric oxide and soda, both x-ray results and physical properties indicate that for small soda content the extra oxygen introduced by the soda (Na_2O) is used up by changing as many as possible of the boron atoms from their triangular bonding into fourfold tetrahedral bonding. The change is equivalent, as far as expansion coefficient is concerned, to replacing a boron by a silicon atom. This change occurs for a soda content up to 13 per cent.

Why do as many boron atoms as possible change when the soda content is 13 per cent or under; and why do they stop changing for a soda content greater than 13 per cent? The answers appear to lie in geometrical considerations closely resembling those which we have seen to govern the question of immiscibility in calcium-silica glass. Again it is a matter of whether ions in the mixture can find suitable surroundings in the volume of material available. If the borons all remain in triangular bonding, the extra oxygen introduced by the soda results in a surplus of oxygen atoms, so that some will be bonded to two borons, and some to only one. These latter oxygens will then be unsaturated and will attract the sodium ions, which seek to surround themselves with unsaturated oxygens. One such oxygen will be present for each sodium ion; hence again it will be necessary for the wandering ion to be in contact with more than one oxygen, and again the question of distance and volume will arise. If the sodium content is small and the ions are uniformly dispersed, as in a homogeneous glass, each sodium ion is geometrically unable to have a suitable surrounding of oxygens. (*Concluded on page 274*)

GLASSY GEOMETRY

(*Concluded from page 273*)

The shifting of boron atoms from triangular to tetrahedral configuration, however, increases the number of unsaturated oxygens, so that the sodium ions have better opportunity for securing suitable surroundings. The change of borons to tetrahedral bonding produces four times as many unsaturated oxygens. In a system of soda and boric oxide, the distance between two sodium ions in contact with oxygens of the same boron-oxygen tetrahedral group must be 5.73 angstrom units, so that for each sodium ion in the mix a volume of 188 cubic angstroms of glass is necessary. A soda content of 12.4 per cent will supply sodium ions in proper proportion to this volume, if as many as possible of the boron atoms change to the tetrahedral co-ordination. For less than 12.4 per cent of soda, the change should be complete, and above 12.4 per cent there is no need for further change, since then an ample supply of unsaturated oxygen atoms will be provided by the soda itself.

The ideas involved here probably underlie the method used in making the new "preformed" glass developed by Corning, which is pictured on page 255. This process starts from a batch containing soda, boric oxide, and silica, which melts to a clear homogeneous single-phase glass. From this, the desired object (for example, a beaker) is readily fabricated. The article is then given a special heat treatment during which some change takes place in the glass, presumably involving a shift of some of the borons to tetrahedral bonding, and as a result a tendency occurs for the sodium ions to surround themselves by the unsaturated oxygens of the tetrahedral groups consisting of a boron and four oxygens. There is hence a tendency for the sodium and boron groups to cluster together — a tendency toward segregation.

If the glass article then is treated with an acid, most of the component consisting of soda and boric oxide leaches out, leaving behind a porous skeletonlike structure which is about 96 per cent silica and 4 per cent boric oxide. Further heat treatment of the article causes the porous structure to contract to a homogeneous glass — the shrinkage in volume running as high as 35 per cent. The article maintains its original shape, however, in spite of that shrinkage. The result is a finished product made of a glass which is nearly pure silica and which has nearly the same small expansion coefficient as fused silica, but which has been made without the expense and difficulty of direct manufacture from silica. Like articles made of fused silica, the preformed glass can be heated to a cherry red and immersed in water without damage.

"PATTERNES AND SAMPLES"

(*Continued from page 258*)

might well visit the physics and chemistry departments, where he would be given some insight into the fundamental developments which immediately preceded the industrial revolution. Subsequent visits to the raw materials departments (fuels and metals and agriculture, textiles, and forestry) would give him an understanding both of the striving of man to secure raw materials and of the application of the fundamental sciences in

the processing and manufacture of products of mine and farm. Logically, the visitor should next devote time to the power and transportation departments; then to graphic arts and the cultural aspects of the Machine Age; and finally to the departments of engineering construction and of the medical sciences, wherein the development of the modern industrial metropolis may be studied from the points of view of the engineer and the public-health expert.

Each section is entered from or near the north hall, and visitors are unconsciously guided through room after room until they leave the sequence not far from the entrance. By-passes are provided at numerous places, and while visitors are encouraged to proceed logically, there is no compulsion to follow a prescribed route.

More detailed discussion of one of the departments, that of fuels and metals, will suggest the activities of a teaching museum. When man discovered the metals, he became civilized; when he uses fuels, he lessens human drudgery. In presenting these facts, the department portrays: (1) basic principles of geology; (2) geology of ore deposits and ore mining and concentration; (3) geology, mining, preparation, and utilization of coal; (4) geology, prospecting, drilling, production, transportation, and refining of petroleum, as well as the properties and uses of its countless products; (5) geology, mining, and transportation of iron ore, its reduction to pig iron, the conversion of pig iron into steel, and the fabrication of this steel by rolling, forging, casting, machining, cold working, and welding; (6) production and fabrication of the important nonferrous metals; (7) properties of metals, how measured, and how improved by alloying and heat treatment; and (8) mining of gem minerals and their conversion into gems.

To illustrate and explain these facts, the sequence includes a coal mine; an ore-concentration table in operation; a full-size oil derrick and pumping-oil rig; a model petroleum refinery in simulated operation; a model of a continuous hot-strip rolling mill, in which slabs of lead are rolled in a blooming mill and are passed through roughing and finishing stands to become strips twenty times their original length; the (*Continued on page 276*)

"PATTERNES AND SAMPLES"

(*Continued from page 275*)

making of small upset forgings; a complete, working, gray-iron foundry; five small machine tools — lathe, drill, miller, shaper, and grinder — which may be hand-operated by the visitor so that the five fundamental machining operations may be learned; demonstrations of electroplating, welding, and heat treating of metals; and physical testing apparatus in operation.

This somewhat lengthy list includes but a small percentage of the exhibits on display but gives, it is hoped, an understanding of the types of exhibits and of the scope of the department. It should be repeated that exhibits are not placed at random but are arranged in logical sequence.

The coal mine and the foundry are two of the most elaborate displays and are very popular. Coal is our principal source of power. The coal industry is therefore of outstanding importance and is entitled to the preferred space allocated to it. The feature exhibit of this section is the coal mine, a full-size representation of a modern bituminous mine. The surface equipment consists of a six-by-ten-foot Nordberg cylindroconical drum hoist, an Allen and Garcia end-lift head-frame standing sixty-five feet above ground level, and a seven-by-three-foot Jeffrey ventilating fan at the air shaft. The visitor is lowered to the shaft bottom apparently five hundred feet below the surface, where he sees a rotary dump and an automatic weight recorder dumping and weighing coal. Later he boards a "man trip" and is hauled to the working face, apparently a mile or so from the shaft bottom. He alights from the train and passes through a number of rooms in which practical coal miners demonstrate and explain the latest types of undercutting, drilling, and loading machines. Throughout the mine the visitor sees a faithful portrayal of a portion of Illinois seam No. 6. Slabs of coal, from draw slate to clay bottom, were removed from the rooms of a Macoupin County mine, were transported to Chicago, and were erected to duplicate the rooms from which the slabs were taken. On leaving, the visitor witnesses a demonstration of the flame safety lamp and other apparatus and methods used to promote mine safety. The combination of reality and illusion has been successful, we believe, in giving the visitor a true picture of modern coal-mining methods in an environment which faithfully portrays the actual mine. The mine was operated from 1933 to 1938 and has been re-opened. During the first five years of its operation 600,000 persons visited it.

During the past few years a committee of the Chicago chapter of the American Foundrymen's Association has joined with the department staff in the planning and erection of an operating foundry. Here the visitor sees the melting of iron in both electric furnace and cupola; the pouring of the molten iron into sand molds; the separation of castings and sand at the vibrating screen shakeout; the cleaning of the castings in a modern equivalent of the tumbling barrel; the grinding of the cleaned castings; the reconditioning of the sand and its movement by bucket elevator and conveyer belts to hoppers over the molding machines; the forming and baking of cores; and the making of molds and placing them on roller conveyers ready for the next pouring. In other words, he witnesses the making of a gray-iron casting from pattern to finished article. All machines, equipment, supplies, and even the pig iron and sand were donated by some sixty contributing companies. The glamour of hot metal and the understanding of how everyday articles are made have resulted in this foundry's vying in popularity and educational value with the coal mine.

It will be noted that some exhibits are historical, others are modern, and still others show the evolution from the old to the new. Some exhibits are static, some operate continuously, some are operated by the visitors, whereas others are demonstrated by the attendants. Exhibit methods include two-dimensional and three-dimensional static material, dioramas, motion pictures, slide projectors, replicas, modern commercial machinery, operating models of processes and plants, and demonstrations of scientific principles and their industrial applications.

The attendants have a very important function — they are lecturers and demonstrators, not guards — and in the course of their lectures and demonstrations use

the exhibits as props. The combination of attendant and exhibit is far more effective than either alone. For example, in the coal mine it is desirable that the men be experienced coal miners in order that they look the part and that they be qualified to answer intelligently questions regarding mining practices. The typical man in the coal mine at the present time is a high-school graduate who, prior to joining the museum staff, had twelve years of coal-mining experience.

In other sections of the museum the best results are obtained by using young men, graduates of universities or technical schools, who have had experience in research or industrial work, and who, in many instances, are working for higher degrees at near-by colleges and universities. The men are moved about from position to position and thus become acquainted with many exhibits. They are thereby broadened educationally, and the possibility of their becoming bored through isolation is minimized.

The method of operation is as follows: At scheduled times a demonstration is started near the entrance to a sequence, and a group of visitors gather. On the completion of this demonstration the group is turned over to another man, who explains other exhibits, and so on throughout the section. The frequency of demonstrations depends on the attendance, an attempt being made to limit the size of groups to twenty-five or thirty. Student groups are handled similarly, although it is customary for the instructors to make arrangements prior to their arrival so that proper facilities will be at their disposal in the sections they wish to visit.

An ideal museum of science and industry should be an educational tool, not a repository of dust-laden relics. It should be dynamic, not static; inspirational, not dull. It should depict the technical ascent of man and the economic and social consequences of that ascent. It should teach scientific principles and their industrial applications. The correlation of scientific facts, of the sciences one with the other, of science to industry, and of industry to everyday life should be forcefully shown by the orderly presentation of exhibit material. By exhibits, dynamic and static, by demonstrations, by illustrated lectures, and by adequate, usable library facilities, these desirable aims may be accomplished.

THE TREND OF AFFAIRS

(*Continued from page 246*)

vastness tends to keep the average reader away from them. More than such siphoning, however, is done by the volume.

The economic, social, and political effects of the rise of technological culture are pretty thoroughly explored by the Rosens, who employ the instructive case study to good purpose, applying it to the cigar industry, to doctors and hospitals, and to government and education and radio as a means of illuminating their general discussion of the three types of effect. The increasingly evident and urgent need for technicians qualified for constant effort in the study of future trends is clearly established by their discussion. (*Concluded on page 278*)

THE TREND OF AFFAIRS

(*Concluded from page 277*)

The citizen whose world has been changed by grace of technological means which he too often takes for granted must, if he is to act sensibly in the direction of preserving fundamental values, have information upon which to base his decisions. For this reason, the Rosens well argue, it is imperative that research in the social sciences result in conclusions which can be and are clearly stated in terms meaningful to the layman. Their own work measures up fairly well to this entirely justified standard, save in unfortunately numerous errors in the technic of language, not all of which can be blamed on the publisher's editor or proofreader, as well as various errors in the transcribing of fact.

The Smellies

LATEST addition to the armament by which those temples of illusion, the movie theaters, strive to capture reality and make things easier for the patron's already coddled imagination is the use of odor synchronized with the screen action. The invention of two Swiss chemists, the process consists essentially of the introduction of appropriate odors through a theater's ventilating system for the length of time required by a scene. Thus the lovers tread over the soft carpet of the forest to the accompaniment of piny perfumes. Or it may be a delicatessen store.

Incisively, if inelegantly, *Variety* has labeled these efforts the "smellies." Commenting on experimental tryouts in the Midwest, it says that the company which has developed scented movies is now working along the idea of a "$10 dingbat which will go readily into any theater's ventilating system" and is attempting to build up a stock of basic odors suitable for use with a majority of features. The magazine adds that the experiment has caused some movie-goers to return to the theater in order to see again the high-mass scene in *Knute Rockne — All American*. They could not believe that they had actually smelled candle wax and incense; they felt that imagination had got the better of them.

With over a thousand available aromatics, many of them synthetics which can be obtained with uniform properties and at moderate cost, perfumers are having little difficulty in finding industrial applications for their wares. Long used on gloves and money and in soap and cigarettes, perfumes are also aiding the sale of fly sprays and dyed textiles (see The Review for June, 1938, page 350). Other recent applications, most of them made necessary by the increased use of chemicals in consumers' products, include raincoats (whose resistance to water may depend on a wide list of plastics and solvents) and shoes (many of which are now put together with very strong synthetic or rubber cements). At the request of the New York World's Fair management — until the procedure was found too expensive as a nightly feature — one perfume company replaced the fishy smell which some noticed during the nine-o'clock fountain display with more suitable odors.

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Come Back to Tech

ALUMNI DAY

June 9

THE MORNING of Alumni Day will be devoted to a conference on the contributions of science and engineering to medical progress for the betterment of society. As a supplement to the symposium both the Main and Rogers lobbies will be the scenes of exhibits of scientific apparatus developed for the advancement of medicine in the diagnosis and cure of disease. . . . At midday, Alumni, their wives, and guests will be served luncheon in du Pont Court. In the afternoon the traditional Class Day Exercises will be held, at which the present senior class (1941) will be initiated as Alumni, and special honors will be paid to the twenty-fifth (1916) and fiftieth (1891) Classes. . . . Following this event a special ceremony will celebrate the twenty-fifth anniversary of Technology's home on the Charles. . . . The grand finale of Alumni Day will be another popular Stein-on-the-Table Banquet at the Hotel Statler — an evening of good fellowship among good fellows.

Relive "those happy days of ours,"
Renew old friendships tried and true.
When you come back a few full hours,
The joys of years come back to you.

June 9

ALUMNI DAY

Come Back to Tech

TECHNOLOGY MEN IN ACTION

CHECK LIST OF THE ACTIVITIES AND ACHIEVEMENTS OF M.I.T. ALUMNI AND OFFICERS

Honor

¶ To GARNETT A. JOSLIN '09, by his election as president of the Mining Association of the Southwest.

¶ To VICTOR DOLMAGE '17, by his election as vice-president of the British Columbia Chamber of Mines.

¶ To HENRY G. HOUGHTON, JR., '27, by the first Robert M. Losey Award for contributions to the science of meteorology as applied to aeronautics.

¶ To C. WILLIAM RADOS '27, by his election as secretary-treasurer of the National Society of Sales Training Executives.

Written

¶ By JAMES HOLT '19, JOHN E. BURCHARD '23, ERNEST N. GELOTTE '23, CHARLES H. BLAKE '25, PARRY MOON '27, LAWRENCE B. ANDERSON '30, EDWIN R. GILLILAND '33, FREDERICK G. FASSETT, JR., Staff, PHILIP M. MORSE, Staff, and JOHN WULFF, Staff, "Contributions of Science and Technology in Building Design: 1891–1941," *Architectural Record*, January.

¶ By HOWARD H. DAWES '23, "Notes on the Care and Maintenance of Variacs" and "Returning Instruments for Repair," *General Radio Experimenter*, January and February.

¶ By ROBERT J. ANDERSON '25, "The Magnesium Industry," *American Metal Market*, January 17.

¶ By MYRON T. SMITH '30, "An Improved Ultra-High-Frequency Signal Generator," *General Radio Experimenter*, February.

¶ By DONALD B. SINCLAIR '31, "A New Null Instrument for Measuring High-Frequency Impedance, "*General Radio Experimenter*, January.

¶ By BENJAMIN W. STEVERMAN '31, "Photo-Electric and Electronic Controls in the Machinery Field," *Machinery*, October.

¶ By BLAKE MILLS '35, "Aerodynamic Action on Wires and Bridges," *Engineering News-Record*, January 30.

¶ By JOHN S. O'CONOR '36, "Science and True Religion," *Scientific Monthly*, February.

¶ By LORING C. FARWELL '37, "A Review of Railroad Financing, 1920–1938: III," *Journal of Land and Public Utility Economics*, November.

Speaker

¶ WILLIAM H. KING '94, on "Expert Testimony from the Point of an Attorney," before the appraisal conference of the New York State Society of Real Estate Appraisers, New York, February 26.

¶ GEORGE E. RUSSELL '00, on "Water Hammer in Waterworks Distributing Systems," before the New England Waterworks Association, Boston, February 20.

¶ WILLARD BROWN '16, on "What's New in Lighting," before the Better Lighting Club, Reading, Pa., February 18.

¶ JOHN T. RULE '21, on "Polaroid and its Application to Aerial Photography and Photogrammetry," before the American Society of Photogrammetry, Washington, D.C., January 24; and on "Mathematics in Three Dimensions," before the National Council of Teachers of Mathematics, Atlantic City, N.J., February 22.

¶ MARTIN T. MEYER '32, on "Variability and the Acceptance of Rodent Baits," Purdue University, January 6 to 10.

¶ WALTER C. VOSS '32, on "Planning and Zoning," before the Society of Residential Appraisers, Boston, January 9.

DEATHS

** Mentioned in class notes.*

¶ WINTHROP ALEXANDER '83, February 7.

¶ HENRY J. WILLIAMS '85, January 31.

¶ HARRY F. TOTMAN '87, December 25.

¶ GEORGE S. LEE '88, January 7.*

¶ CHARLES A. STONE '88, February 25.*

¶ FREDERICK B. GAENSLEN '91, January 27.

¶ WILLIAM H. CADWELL '93, February 20.

¶ WILLIAM B. GAMBLE '93, February 14.*

¶ WILLIAM R. WESTCOTT '94, February 9.*

¶ JOHN G. CALLAN '96, December 31.*

¶ WILLIAM G. WALL '96, January 16.*

¶ THOMAS F. CARROLL '98, February 7.*

¶ JOHN B. DIXON '98, December 12.*

¶ GEORGE E. MATHEWS '98, October 13.*

¶ EDWARD H. HAMMOND '99, November 28.

¶ CARLETON ELLIS '00, January 13.

¶ ISAAC D. BARDIN '01, July 9.*

¶ ROBERT V. BROWN '02, December 23.

¶ HERBERT F. DALY '02, September 7.

¶ HERMAN A. SCHERRER '03, February 15.

¶ DONALD R. BATTLES '05, January 20.*

¶ GEORGE H. CHAMPAGNE '05, February 17.

¶ LEBARON TURNER '05, January 21.*

¶ CLAYTON R. DENMARK '07, December 22.*

¶ LESLIE C. WHITTEMORE '07, January 13.

¶ BURTON W. CARY '08, December 6.*

¶ WALDO P. DRULEY '08, July 1.*

¶ PAUL E. FERNALD '08, January 8.*

¶ RALPH E. MANNING '08, February 16.*

¶ WILLIAM J. KELLY '09, December 30.

¶ HERBERT S. GOTT '10, January 29.*

¶ J. HOWARD DUNLAP '11, March 4, 1940.*

¶ JOHN G. LANNING '13, November 28.

¶ GUERNSEY A. PALMER '15, February 7.*

¶ STANLEY R. CUMMINGS '18, February 4.*

¶ PAUL RYAN '23, December 25.

¶ JOHN H. EAKIN '38, February 6.*

¶ CHARLES V. CHAPIN, Former Staff, January 31. Superintendent of health in Providence, R.I., for forty-eight years, Dr. Chapin was known the world over for his work in sanitation and infection. From 1913 to 1918 he lectured before Technology students. His theory of "the person, not the thing" combatted the generally accepted idea that germs of disease were communicated through the air. Application of his theory led to the discontinuance of fumigation as a form of terminal disinfection and won for him the praise of the hygiene section of the League of Nations. Dr. Chapin received many honors and awards. Notably, he was the first recipient of the Sedgwick Medal, awarded by the American Public Health Association in memory of William T. Sedgwick, former Head of the Institute's Department of Biology and Public Health.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

M.I.T. Club of Akron

About twenty members attended the first meeting of the year on February 17 at the Liedertafel Club in Akron. Considering the weather, the turnout was good. The speaker was Ford F. Hunsberger, manager of the subdivision of the Ohio State Division of Aid to the Aged. The subject was ably presented, and all the members joined in asking questions. Several of the new and younger members were present.

Clarence W. Stacey '32, of the airship operations department of the Goodyear Tire and Rubber Company, has been called to active duty in the United States Navy and is now located at Lakehurst, N.J. — JAMES E. CONNOR '23, *Secretary*, 1746 13th Street, Cuyahoga Falls, Ohio.

M.I.T. Association of Buffalo

The annual dinner meeting of the Association was held on February 4 at the Wurtzburger-Hof in Buffalo. During the meeting plans were formulated for a dance to be held in April, and suggestions were submitted for future meetings. Election of officers for the coming year was held, and John D. Rumsey '33 and Timothy J. Coleman '34 were re-elected to the offices of president and vice-president, respectively. Bernard H. Nelson '35 was elected secretary-treasurer.

Following the business meeting a very interesting illustrated talk was given by Lauren Hitchcock '20 on "Earlier Days at M.I.T." In conclusion Mike Kelakos '35 sang several "Tech Show" hits of the past and led the group in the "Stein Song" to close the meeting. — BERNARD H. NELSON '35, *Secretary*, 68 Dorchester Road, Buffalo, N.Y.

M.I.T. Club of Dayton

In our loosely knit organization the officers change every time the bank balance approaches zero. The retiring leaders choose their successors, hastily nominate, extol, and elect them, and then exit hurriedly. By choosing a well-attended meeting and by immediately collecting a new batch of dues before the soot settles, we are able to keep the treasury in rather good condition. Such an "uncoup" took place on November 30, adding $10.00 to our available funds and placing the following men in office: Charles S. J. MacNeil, Jr., '33, President; Kendall Clark '31, Vice-President; and Irvine E. Ross, Jr., '30, Secretary-Treasurer.

The foregoing account of our election is not designed to throw any discredit on the work of our escaping officers, who had served us diligently and thoughtfully for nearly two years. However, it is an eyewitness account and is accurate in every detail.

We were privileged to hear a talk by our erstwhile President, Benjamin S. Kelsey '28, on the war, conditions in England, and how we Americans are being affected. Captain Kelsey spent some time in Europe early in the summer and has an unusually refreshing point of view about what our individual contribution toward the preservation of our way of living should be. Our noontime meeting lasted until well after four o'clock.

Our meeting of January 11 drew an attendance of twelve. After lunch we joined the junior members of the Engineers Club of Dayton to hear a talk on patents by Captain Greer, who is connected with a firm of patent attorneys in Dayton. Greer presented much information of definite interest to the engineer who tries to put old things together in a new way to produce startling results. The speaker threw considerable light on the relationship under our patent law between corporations, their designers, and their products.

Seventeen members and five guests were present on February 15 to hear W. J. Blanchard, a graduate of the University of Kansas and general manager of the newly formed Aeroproducts division of the General Motors Corporation. His subject, "What's New in the Aircraft Industry," covered the changes in attitudes which have resulted from the remarkable expansion now taking place in that industry. His remarks were as up to the minute as tomorrow's newspaper and much more authentic and informative. When expansion is so rapid, Blanchard said, something has to give. In this case, conservatism in all fields allied to industry has been forced into the background. A new sort of well-thought-out liberalism is guiding the course of finance, engineering, purchasing, inspection, production, and management.

At our meeting on March 8, L. Luzerne Custer '13 presented a motion picture report of "Ten Hops about the Caribbean." The pictures are in color and are well worth seeing. Said Mr. Custer: "The pictures are all edited and placed on a single large reel. There is none of this 'time out for reel changing' business when I show my pictures."

We try to meet at noon on the second Saturday of each month at the Engineers Club. Any traveling Alumnus who is in the city will get a hearty welcome at our meetings. — IRVINE E. ROSS, JR., '30, *Secretary*, 3824 West Hillcrest Avenue, Dayton, Ohio.

Rocky Mountain Technology Club

An outstanding meeting of Denver Alumni was held at the University Club on the evening of February 13. Following the dinner, members of the Club listened to an intensely interesting address by Donald E. Cummings '23, associate professor and director of the division of industrial hygiene at the University of Colorado School of Medicine. Cummings is a graduate of the United States Military Academy and was formerly director of the Saranac Laboratory at Saranac Lake, N.Y. Professor Cummings gave an outline of the scope of industrial hygiene and illustrated his remarks with local conditions. His talk was followed by an extended discussion on subjects varying from silicosis to the basis for the grading or measuring of civilization. — The following members were present: Severance Burrage '92, Harold O. Bosworth '02, John J. Falkenberg '19, Dana E. Kepner '21, Arthur L. Hill '23, Isadore Silverman '28, Anthony J. Perry '29, and Stanley S. Rudnick '32. — HOWARD N. LARY '27, *Secretary*, 822 Midland Savings Building, 444 17th Street, Denver, Colo. SEVERANCE BURRAGE '92, *Review Secretary*, University of Colorado School of Medicine, 4200 East Ninth Avenue, Denver, Colo.

M.I.T. Club of Northern New Jersey

As the 1940–1941 season rolls on harmoniously and successfully, it seems well to look at the Club's activities from the annual standpoint to measure the Club's firmness and permanency. After the organization work of the new officers in the fall, Thursday, November 14, saw our annual fall smoker with about 175 in attendance. The topic was concurrent with the times, and Roy M. Jones, supervisor of the eastern district, Air Corps Procurement, United States Army, spoke to us on "Military Aeronautics." Colonel Jones's review of our past and present status was more reassuring than some previous reports, and his human interest presentation made the talk most interesting. Also, Henry Paynter, assistant managing editor of *P.M.*, discussed fifth-column activities in the United States. He said, "Enlisting our sympathy, spreading fear in the country, and sabotage are the chief works of the fifth columnists."

With a well-organized group of Honorary Secretaries, the Club has been able to make excellent studies in recommendations for scholarships at M.I.T. Al Phillips '10, chairman, reports that 1940 saw seventy-two studies, of which about two-thirds were recommended. Recently the Club has added scholarship-study responsibility for Atlantic, Cumberland, and Cape May counties in South Jersey; Harold I. Eaton '09 and his brother, Charles A. Eaton '07, will head the local board there to hear the young men.

Luncheons have been held as usual at the Newark Athletic Club on Thursdays, to bring together more of our men. Regional meetings have been planned as in past years to unite the men in their own communities. Practically 100 per cent of the Alumni resident in Summit turned out for a meeting there in November under the leadership of Regional Chairman Ralph S. Wetsten '21. A meeting of the Ridgewood group was planned by Regional Chairman Arnold G. Roman '29 and Sumner Hayward '21 for March 20 at Burke's restaurant, Hohokus, and recent M.I.T. films supplied through the courtesy of Charles E. Locke '96 were on the program.

On February 20 came the annual stein party at Feigenspan's brewery in Newark, where Bill Rose '21 is a general manager. With a limitation of 150 members because of the facilities available, the Club enjoyed a real carousal and evening of fun and hilarity with plenty of beer after a glorious dinner. As in the past, Charlie Roche '23 provided a five-piece orchestra to give us plenty of music for our stein songs. This time the party honored the fiftieth year after graduation for George M. Warner '91, of Great Notch, one of our most interested members, and the crowd was swelled by the presence of Louis W. Pflanz, Jr., '35 of Bristol, Tenn., who had just arrived in town.

Plans are already being considered for the annual spring banquet; speakers and entertainment of the highest caliber are under consideration by the banquet committee, of which Warren H. Dolben '30 is chairman. The date has been set for Thursday, April 24. Robert E. Wilson '16, President of the Pan American Petroleum and Transport Company and a member of the National Defense Advisory Commission, has been signed up as toastmaster, so the foundation for an entertaining as well as instructive evening has been laid.

Our Club is pleased to say that under its sixth President, Miles Pennybacker '23, it is making progress and helping in a multitude of ways to keep our Alumni co-ordinated and in good spirits. Recent checks of our membership committee show that we have 1,520 names in our files, representing the twelve counties of North Jersey; ours is a real body, well organized and eager to salute M.I.T. whenever the opportunity arises. — AUGUST P. MUNNING '22, *Secretary*, Munning and Munning, Inc., 202 Emmett Street, Newark, N.J. FREEMAN B. HUDSON, JR., '34, *Assistant Secretary*, Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N.J. NEWTON S. FOSTER '28, *Assistant Secretary*, 73 Daniel Avenue, Rutherford, N.J.

Technology Club of New York

It was the unanimous opinion of all who were present that the annual dinner dance held in honor of President and Mrs. Karl T. Compton at the Biltmore Hotel on February 5 was the most enjoyable social affair in the recent history of the Club. The event differed from similar dinners in the past in that there were no speeches, with the exception of a few words by Dr. Compton, and that a pleasant informality reigned throughout the evening.

Entertainers from the currently popular Gay Nineties Club serenaded the diners during the early part of the evening. Music was supplied by the well-known Biltmore orchestra, and a group of Arthur Murray dancers entertained after the dinner.

The dinner dance was under the patronage of a distinguished group of Technology Alumni, including: Edwin S. Webster '88, Pierre S. du Pont '90, Willis R. Whitney '90, James A. Emery '93, Frederic W. Lord '93, Alfred P. Sloan, Jr., '95, R. E. Bakenhus '96, Thomas R. Weymouth '97, Henry E. Worcester '97, Frank F. Colcord '98, Van Rensselaer Lansingh '98, Philip W. Moore '01, William M. Vermilye '01, Asher L. Weil '01, Charles W. Kellogg '02, Clyde R. Place '02, Walter M. Drury '03, Raymond Haskell '03, J. Howard Pew '03, George W. Burpee '06, Joseph V. Santry '06, John M. McMillin '07, William B. Given, Jr., '08, Thomas C. Desmond '09, B. Edwin Hutchinson '09, Harold McCready '09, Maurice R. Scharff '09, Paul M. Wiswall '09, William C. Arkell '10, Richard S. Bicknell '10, Harold N. Cummings '10, George W. McRae '10, Livingston P. Ferris '11, Robert T. Haslam '11, Rufus E. Zimmerman '11, Page E. Golsan '12, Herman A. Affel '14, Charles P. Fiske '14, Egbert C. Hadley '14, Alfred H. Schoellkopf '15, Thomas D. Brophy '16, George J. Mead '16, Robert E. Wilson '16, Adolphe H. Wenzell '17, Marvin Pierce '18, Herbert G. Fales '19, Timothy E. Shea '19, Alexis R. Wiren '19, Frank L. Bradley '20, Edwin S. Burdell '20, Alfred T. Glassett '20, William R. Hainsworth '21, George S. Piroumoff '21, Charles G. Dandrow '22, Duncan R. Linsley '22, William H. Mueser '22, Henry B. du Pont, Jr., '23, Robert P. Shaw '23, Crockett A. Harrison '26, James G. Walker '26, Lewis F. Baker, Jr., '27, William P. Winsor '27, and Alfred L. Loomis, Edmund C. Mayo, Gordon S. Rentschler, and Albert H. Wiggin of the Corporation, as well as the wives of many of these men.

The annual Course I luncheon on January 16 attracted a large group of Alumni. Among those present were: Robert S. Weston '94, Charles B. Breed '97, Paul L. Price '00, William M. Bassett '02, Farley Gannett '02, Henry Manley '02, Frederick G. Bennett '05, Louis E. Robbe '05, Edward S. Chase '06, Harold P. Farrington '07, Arthur S. Douglass '08, Karl R. Kennison '08, Harold N. Cummings '10, Richard H. Gould '11, Robert A. Allton '13, Eugene L. Macdonald '13, M. Warren Cowles '15, Charles W. Williams '15, Charles L. Coburn '17, Richard S. Holmgren '19, Stanley C. Reynolds '20, Charles L. Pool '21, Lawrence M. Gentleman '22, Samuel I. Zack '22, William S. LaLonde, Jr., '23, James M. Robbins '23, William S. Wise '23, William H. Correale '24, Richard T. Lassiter '24, Edward S. Sheiry '24, Edward Wininger '24, Frank N. S. Thomson '25, Alton S. Heyser '26, Richard S. M. Lee '26, Edward J. McGrew, Jr., '26, John B. Drisko '27, William R. Frederick, Jr., '27, Gordon R. Williams '29, Rolf Eliassen '32, Ingvald E. Madsen '33, William M. Murray '33, Donald W. Taylor '34, James A. Emery, Jr., '38, John E. Kiker, Jr., '35, and Fred F. Flowers '41. — JOHN J. MURPHY '23, *Secretary*, 24 East 39th Street, New York, N.Y. CONSTANTINE S. DADAKIS '34, *Publicity Committee*, 644 Riverside Drive, New York, N.Y.

M.I.T. Club of Western Pennsylvania

Samuel C. Prescott '94, Dean of Science and Head of the Department of Biology and Public Health at M.I.T., was the principal speaker at the January dinner meeting of the Club, held at the University Club in Pittsburgh. E. J. Casselman '15, President, greeted all the members and the guests and presided at the dinner. Dr. Blank of the H. J. Heinz Company food laboratories in Pittsburgh was a guest.

W. U. C. Baton '04 raised the question concerning the part that M.I.T. has in the National Defense Program and introduced Dean Prescott as the man who would enlighten us on this topic. After relaying greetings from President Compton and other Institute officials, the Dean named various men on the Technology Faculty and told of the part that they are playing in the defense program. At the request of the Navy Department, he said, a special Course in Aeronautical Engineering is available to all seniors, and may be taken in place of a thesis. Upon completion of the Course the student may qualify as an ensign in the United States Naval Reserve. In concluding his talk, Dr. Prescott showed colored films taken at the Institute, portraying all the recent advances which have been made in buildings and equipment and which affect both the technical and the social aspects of Technology.

At the meeting special tribute was paid to F. J. Chesterman '05, who will soon leave Pittsburgh for Philadelphia to take up his new position as executive vice-president of the Bell Telephone Company of Pennsylvania. Both G. W. Ousler '16, general sales manager of the Duquesne Light Company, and E. A. Holbrook '04, Dean of the schools of engineering and mines of the University of Pittsburgh, traced briefly Chesterman's career and their personal associations with him. They expressed the feelings of the Club in wishing him the very best of everything in his new position. In addition to his remarkable record with the Bell Telephone Company, Chesterman is noted as a leader in civic affairs. He serves as a director of the Boy Scouts of America, a member of the Pittsburgh Chamber of Commerce, and a past president of the Engineers Society of Western Pennsylvania. — F. REED DALLYE '22, *Secretary*, Aluminum Company of America, 801 Gulf Building, Pittsburgh, Pa. PAUL R.

DES JARDINS '38, *Assistant Secretary*, 1945 Koppers Building, Pittsburgh, Pa.

CLASS NOTES

1888

Charles Augustus Stone, one of our most distinguished classmates, died of pneumonia at his home at 907 Fifth Avenue, New York, on February 25. He was cofounder, with Edwin Sibley Webster, also of our Class, of Stone and Webster, Inc., one of the largest engineering firms in the world. Although he had been in delicate health for a year or more, his death came as a shock to his intimate friends and classmates. We quote from the New York *Times:* "Born in Newton, Mass., Mr. Stone was the son of Charles H. and Mary Augusta Green Stone. After attending Newton High School he entered . . . Technology . . . as a member of the pioneer course in electrical engineering. . . . Upon graduation Mr. Stone worked in the research laboratories of the Thomson Electrical Welding Company, forerunner of the General Electric Company. In 1889 he formed a partnership with Mr. Webster under the name of Massachusetts Electrical Engineering Company, Stone and Webster, managers.

"In 1890 the firm obtained its first engineering and construction contract, the installation of one of the country's earliest commercial hydroelectric plants at Saccarappa, Me. Although it developed only about 400 horsepower and the transmission distance was about one mile, the installation proved the commercial practicality of electric transmission of power.

"It built Southern California Edison's Big Creek hydroelectric stations and Long Beach steam power station; Mississippi River Power's plant at Keokuk, Iowa; Niagara Hudson's station at Oswego, N.Y., and the hydroelectric plant and dam on the Susquehanna at Conowingo, Pa.

"Stone & Webster also constructed buildings for the Massachusetts Institute of Technology, the University of Pittsburgh's Cathedral of Learning, the fifty-story General Electric Building in New York, and industrial plants for such companies as the Johns-Manville Corporation, Ford Motor Company and Westinghouse Electric and Manufacturing Company.

"In 1917 Mr. Stone visualized and his firm undertook construction of the fifty-way shipyard at Hog Island, Pa. There 122 vessels averaging 8,000 tons were built in record time on a new principle, the parts being manufactured on specifications in factories situated throughout the country, Hog Island acting as a huge assembling plant.

"Also during the World War Mr. Stone's organization built the aviation camp, barracks and balloon school at Kelley Field, Texas; enlarged several arsenals, and constructed the large ordnance base of the American Expeditionary Force in France.

"In 1925 Mr. Stone arranged the purchase of the Virginia Electric and Power Company from the Gould interests, and, with it as a nucleus, formed the Engineers Public Service Company, of which he was chairman for several years. The company acquired properties in Georgia, Louisiana, Texas, New Mexico, Nebraska, Washington and other states. For a time Engineers Public Service Company was a subsidiary of Stone & Webster, but after the enactment of the Federal Public Utility Holding Company Act this interest was disposed of.

"Mr. Stone served as a director of the Federal Reserve Bank of New York, . . . and for many years was a director of International Mercantile Marine Company, International Acceptance Bank, Inc., Bank of the Manhattan Company, the North American Company, First National Bank of Boston, Research Corporation and Union Pacific Railroad.

"He was for many years a member of the executive committee of Massachusetts Institute of Technology and was active in raising funds for the Institute and in its removal from Boston to Cambridge.

"Mr. Stone bred horses and cattle on his farms in New Hampshire, Massachusetts and Virginia. He was among the first to import the Welsh pony into this country and for many years bred Morgan and Thoroughbred horses.

"In 1902 he married the former Mary Adams Leonard of Boston. Mrs. Stone died on Oct. 6, 1940. Surviving are two daughters, Mrs. R. C. V. Mann and Mrs. Edward C. Brewster, and two sons, Charles Augustus Stone Jr. and Whitney Stone." — Stone always took a deep interest in Class affairs and attended the majority of our reunions and dinners. His presence will be missed by all of us.

Sanford Thompson has been called to Washington as consultant to the secretary of war. He started work on February 5. With his experience of nearly fifty years in systematizing and accelerating all kinds of manufacturing processes, he is just the man to show the officials at Washington how to speed up the production of airplanes, ships, and tanks to aid Britain before it is too late.

During last fall and winter the fact was brought home to your Secretary that the Class should have an Assistant Secretary in the Boston area to take care of emergencies and class matters requiring immediate attention while your Secretary is at Chebeague Island from May to October and in Princeton from October to May. President Webster independently saw the need and suggested that Sanford Thompson be appointed for the job, subject to confirmation at our next class meeting in June. All of this happened before Sanford was called to Washington. But to Sanford's suggestion that his appointment be delayed a while neither President nor Secretary agreed. So now the Class has a brand new Assistant Secretary, subject only to confirmation by the Class.

Ted Foque, our live wire of the Northwest, has written a breezy letter demonstrating that his memory and eyesight are better than mine. He says: "I have just read your class notes in the February Review. It is too bad that you did not have the rest of the story about Ellis' fight. I do not recall the fight itself very clearly, but I am sure that it was the same one in which Fred got a black eye. His father was very much opposed to the boxing stuff, and the eye would have been a giveaway; so Eastman and I took him over to Henry's room and applied such remedies as were considered good for casualties of that kind. He stayed in town for a time, and as I recall it, his father never caught on.

"Our younger grandson is at the Los Alamos Ranch School, high in the mountains of New Mexico. It is apparently an ideal school in ideal surroundings, and the boy is having the time of his life. The older boy is in his third year at Williams and thinks it the finest college in the country. They have a very good course in astronomy and navigation which appeals to him strongly, so before this fracas is over, he may find himself on the bridge of some naval craft."

Without the help of Ben Buttolph these notes would be incomplete and lack much detail. In regard to our late classmate, George S. Lee, Ben writes that O. W. Stewart '11 says that Lee was a neighbor of his in Hyde Park, a very quiet man, a devout Unitarian, and a good neighbor. His hobby was steam locomotives. He was familiar with many of the historic engines of the early days of railroading.

If your Secretaries, both old and new, can team together on work for the Class as they have in golf for the last thirty years, we trust that it will be satisfactory to the other members of the Class. — BERTRAND R. T. COLLINS, *Secretary*, 57 Wiggins Street, Princeton, N.J. SANFORD E. THOMPSON, *Assistant Secretary*, Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston, Mass.

1890

An inquiry concerning an address in Florida brought an announcement of the wedding of Mrs. Amarilla H. Crandall and William Parker Flint on December 18 in Pennsylvania. To them, '90 extends hearty congratulations and best wishes. The Flints will remain in Florida until the latter part of April and then will return to Tom's River, N.J. Flint writes that last summer he made a stag trip of 11,011 miles to Seattle, Los Angeles, and back in his car and enjoyed the journey thoroughly. At Seattle he saw Charles Alden, and in a lunchroom in Yellowstone Park, one of our coed classmates, whose name he failed to recall at the moment.

Albert F. Brown has retired from active work and his address has been changed from Providence, R.I., to 162 Maple Street, Malden, Mass. He was with the Boston Elevated Railway on elevated and subway construction for twenty years, and then put in twenty-three years as fire-protection engineer with the Eastern Underwriters Inspection Bureau. — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4–136, M.I.T., Cambridge, Mass.

Please turn to page I for information on Alumni Day, June 9

1893

National defense, in these days of mechanized warfare, is making an unprecedented demand for engineers of all ages in every field of engineering activity. Recently the press reported an urgent demand for at least 50,000 of this year's graduates from the country's engineering schools, whereas the 1941 graduating classes will, in the aggregate, number but 12,000 men. Already the schools are being urged to speed up the educational process and if possible to compress the four-year training courses into three years. The pressure for engineering service upon the various governmental agencies, notably the War and Navy departments, is far and above what these agencies, with their peacetime staffs, are equipped to handle. Instead of attempting to expand their own engineering staffs adequately to cope with the situation, a process involving lost motion until the expanded staffs could be whipped into shape for teamwork, both the War and Navy departments, under far-sighted legislation secured in 1939, are calling upon established engineering organizations to take over the planning and design of much of their enlarged programs of construction work. Thus far there has been little opportunity to ascertain how far '93 men have been called upon to participate in this work. It is hoped that men of the Class will report their activities insofar as such activities may be given publicity. Certain examples of participation in national defense work by engineering organizations manned by '93 men may now be cited: Ford, Bacon and Davis, Inc., of New York, of which Jim Emery is vice-president, is serving the War Department as engineer on the army base at Bermuda in association with the Boston engineering firm of Metcalf and Eddy, which is composed largely of Technology men. The all-Technology Boston engineering firm of Fay, Spofford and Thorndike (Fred Fay and Charles Spofford of '93, John Ayer '05, C. A. Farwell '06, B. A. Bowman '09, and R. W. Horne '10) is particularly active in defense work. Last November it was called by the Army Engineers to take charge of engineering on the army base at Newfoundland. In this work it is associated with the well-known New York architectural firm of Shreve, Lamb and Harmon, which is handling the architectural design of the Newfoundland base. In October, at the request of the Navy Department, Fay, Spofford and Thorndike became associated with three New York engineering organizations, the four constituting a joint-venture organization for the single purpose of undertaking the design of Navy dry docks for the Navy's Bureau of Yards and Docks. This combination, known as Dry-Dock Engineers, has its principal office at 27 William Street, New York. Since midsummer of 1940, the firm of Fay, Spofford and Thorndike has been serving the Bethlehem Steel Company, shipbuilding division, as engineer on the extensive enlargement of that company's Fore River Yard at Quincy, Mass. The Assistant Secretary, as "special national defense reporter" for the Class, asks '93 men everywhere to inform him promptly as to what they are doing toward preparing a warm reception for Herr Hitler if and when he decides to cross the Atlantic.

An appreciation of Harry N. Latey, chief electrical engineer of the New York City Board of Transportation, has been given by his former chief, the late Robert Ridgway, past president of the American Society of Civil Engineers. Shortly before his death in December, 1938, Mr. Ridgway had completed the dictation to his wife of reminiscences of his lifetime which included well over a half century of notable engineering work. Last year these reminiscences were published by Mrs. Ridgway for private circulation, and with her permission we quote from the book, *Robert Ridgway*, his reference to Harry: "Harry N. Latey was chief electrical engineer. He was a graduate of Massachusetts Institute of Technology, and was connected with the I.R.T. for a time. He is the inventor of a number of electrical devices which I understand are in successful use today. During the construction of the Dual System when Mr. Turner was chief engineer, Latey was appointed by the Public Service Commission, and has been with the Commission and its successors ever since. He has rendered a great service to the organization. When an engineering problem is put to him he comes across with a solution. He is extremely conscientious, but has a bad habit of taking his work home with him, not getting enough rest. Like all men of inventive mind he is never satisfied with anything but perfection. It was under Latey's direction that the 207th Street yard and general shops, as well as the several inspection shops of the Independent System were designed. They work well, and I doubt whether anyone could have done better. His health is not robust, and I wish he would take care of himself for he is a valuable man."

William Burt Gamble, who died on February 14, within two weeks after his retirement (at the age of seventy) from the position of chief of the division of science and technology, New York Public Library, was a graduate in Course IX, General Science. In our day but few men took Course IX, preferring instead the more specialized training of the other Courses. The value of the broad scientific training which Course IX affords is exemplified by Gamble's career, the following account of which appeared in the New York *Herald Tribune* of February 16: ". . . He was born in East Saginaw, Mich., and was graduated in 1893 from the Massachusetts Institute of Technology. He was graduated in 1911 from the New York State Library School in Albany, which was merged in 1926 with the School of Library Service of Columbia University.

"For some years after his graduation from M.I.T. Mr. Gamble was engaged in mining. In 1898 and 1899 he was secretary of the Cement Creek Gold Mining Company. From 1900 to 1903 he was with the Notaway Gold Mining Company, of Silverton, Col., and from 1903 to 1907 with the Detroit Graphite Manufacturing Company as advertising manager.

"He became assistant in the division of technology at the New York Public Library in August, 1911. Bibliographies compiled by him and published by the library dealt with asbestos, the chemistry and manufacture of writing and printing inks, color photography, scenic art and stage machinery, hand spinning and weaving, history of aeronautics, typewriter manufacturing and electric welding. He also assembled manuscript records of the Croton Aqueduct. His wife, Mrs. Frances Saunders Gamble, and a sister, Mrs. William C. Martin, survive."

The death of Glenn Charles Brown on October 4, 1932, has just been reported to the Alumni Office. He will be remembered as a student in mining during our four undergraduate years, but he was not graduated with the Class. After leaving Technology he worked in the mechanical department of the Minnesota Mining Company, and later had charge for three years of the mechanical departments of all that company's mines on the Mesabi Range. He was manager of the Genoa Iron Company at Sparta, Wis., for two years and afterward was manager of the Fayal Iron Company at Eveleth, Minn. When last heard from, in 1909, Brown was living in Birmingham and was superintendent of mines at Muscoda, Wis., for the Tennessee Coal, Iron and Railroad Company of Bessemer, Ala., having entered the employ of that company in 1902. He was married in 1899 to Miss Minnie E. MacLean, who died in 1902.

William W. Carter had the leisure and good sense to forsake his northern home in Needham, Mass., to spend the winter at Miami, Fla. Cadwallader Washburn, artist and writer, who through the years has roamed over a good part of the globe, likewise appreciates the warmth of the sunny South, his address having been reported early in February as 1511 Louisiana Avenue, New Orleans, La.—FREDERIC H. FAY, *Secretary*, 11 Beacon Street, Boston, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, 551 Tremont Street, Boston, Mass.

1894

In the notes in the December Review I spoke of the great pleasure which the Class had in welcoming Raymond Price back for the Alumni Day festivities and later mentioned that Price and his wife were planning to leave by clipper for Europe soon after their Boston visit. Weeks went by without any information, but in the large sheaf of Christmas greetings came a card and a cordial note from Price stating that they had returned to California and were staying at 667 South Hoover Street in Los Angeles. It is a great relief to Price's many friends that he and his wife are still in this country, although we know how anxiously they must scan the news from France and how uncertain they are sure to be regarding the fate of their beautiful home on the banks of the Seine.

1894 Continued

In the considerable and enthusiastic crowd of Alumni which gathered for the smoker in Cambridge on February 27 were John Chapman, Nathan Day, and your Secretary. We met entirely by chance, but I think we were the only representatives of the Class. There was only brief opportunity for discussion of old times, but Chapman mentioned with deep interest his attendance at our fortieth reunion in 1934 and his regret that he could not have been at the forty-fifth. After many years as engineer for one of the large insurance companies, he was obliged to retire a few years ago because of a serious heart attack and has lived quietly but obviously happily ever since. In fact, so well and robust did he appear that Day and I both insisted that he could secure no sympathy from any member of the Class, and I repeated to him the statement which Professor Sedgwick often made years ago, that the way to have a long life was to get a chronic ailment and take care of it. Chapman is still living in Newton, and we hope he will be on hand for our fiftieth reunion. — Day is continuing the practice of law at 84 State Street. Apparently it agrees with him, for he changes little with the years. He is one of our most loyal Alumni as well as an alumnus of Harvard, and we always look forward to his attendance at reunions.

Day mentioned that William R. Westcott died on February 9 at his home, Rock Springs Farm, in the town of Harvard. Westcott was graduated from Harvard with an A.B. degree in '92 and the following autumn entered the Institute in the Course in Electrical Engineering and received his S.B. with our Class. For thirteen years he was manager of the Manchester, N.H., office of the New England Telephone and Telegraph Company. He then accepted a position with the Lord and Burnham Company, greenhouse constructors, Irvington, N.Y. He later became a director, secretary, and purchasing agent of the latter concern. Ten years later he left that business, bought a large orchard in Harvard, Mass., and had since been engaged in raising apples and in developing farmers' co-operative marketing. Westcott was born at Lexington, Mass., on December 31, 1868, the son of Henry and Sarah A. (Read) Westcott. He prepared for college at Cambridge Latin School. In 1908 he married Sophia Lord Burnham of Irvington. They had two daughters and a son. Westcott was a fine and cultured man, rather retiring in character. For many years he had not appeared at any meetings or reunions of the Class. Possibly his allegiance was greater to his first alma mater. It happened that Day knew Westcott very well in college, and in our conversation at the Alumni Smoker, Day mentioned the quiet and unobtrusive characteristics which Westcott had always displayed. He spoke very highly of him as a man of individuality and character. The sympathy of the Class is extended to his family.

John Ferguson is another of our Class who has retired from active professional work. After spending most of his life as an engineer with the various boards of the Commonwealth of Massachusetts, John has sought a milder clime for his years of leisure, if one can believe he can be leisurely, and is now living at 6914 Northeast Fifth Avenue, Miami, Fla.

It is the function of the Secretary to report items whether pleasant or otherwise. The next has elements of both characteristics. Our greatly esteemed Mrs. De Lancey suddenly found in the autumn that she would have to curtail some of her activities by order of her physician, but a recent letter from her brings the good news that she is far on the road to recovery and again is anxious to be on the go. We may reasonably expect, therefore, to hear that as soon as conditions warrant she will be traveling to some remote and interesting place on the earth's surface and sending back interesting letters regarding the people, their architecture, and their art. The Secretary will be looking forward to such letters and will share them with the Class. — SAMUEL C. PRESCOTT, *Secretary*, Room 3-207, M.I.T., Cambridge, Mass.

1895

The rigors of winter weather induce one to seek a warmer climate. For this reason these notes were written in the cool air and amidst the Florida sunshine. Jack Gardiner returned from a two months' stay in St. Petersburg, Fla., to be with his son Giles, who was scheduled to sail on March 14 to Brazil as a missionary. Charles M. Gay has moved to 2031 Locust Street, Philadelphia, Pa. Walter D. Bliss is still in San Francisco, Calif., but his new address is Bliss and Fairweather, 606 Hobart Building.

The recent mailing of ballots for election of the President of our Class has revealed the passing of William Parker Sargent, VI, on November 9, 1936. Mrs. Sargent's letter stated that her husband died suddenly at their home on 17 West 10 Street, New York City.

Following the death of our Tommy Booth last October, your Secretary was reluctant to assume the responsibilities of the class activities without a President. Since Tom came from the Boston section of class members, your Secretary discussed the selection of a candidate with a number of men in this district, and they concluded to get, if possible, some member who hailed from the New York section. With the assistance of Gerry Swope, who is always ready to help the Class, we were able to have Al Sloan accept the nomination. Ballots were prepared and mailed to every active member of the Class. The returned ballots resulted in the election of Alfred Pritchard Sloan, Jr., as president of '95.

We are indeed grateful that Al has consented to be our President. His many business connections exact their toll on his time, but we know that when he decides to do things he does them well, and the Class is to be congratulated upon his acceptance. Your Secretary feels better, now that we have a President. Two men in a boat are company. We sincerely look forward with the hope that all of us may be able to get together again at our fiftieth reunion in 1945. In the meantime let your Secretary hear from you occasionally. He will deeply appreciate it, for he still has to write these notes for you to read every month. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, 10 Clinton Place, Mount Vernon, N.Y.

1896

The Secretary is now able to give definite information on Arthur Baldwin, as he has finally consummated his plans for residing in Virginia, and he is now located at 1106 Rugby Road, Charlottesville.

The Secretary has had occasion to make two trips recently to New York. The occasion of the first trip, on February 5, was the dinner dance of the New York Technology Club in honor of President and Mrs. Compton at the Hotel Biltmore. The only other '96 man present was Bakenhus, with whom the Secretary sat. The second trip was to attend the convention of the American Institute of Mining and Metallurgical Engineers, and at that time the evening of February 24 was set aside for a dinner at the Technology Club with the '96 crowd now around New York. This was a real occasion which had been carefully and thoroughly planned by Bakenhus. The fellows who turned up were Bakenhus, Gaylord Hall, Locke, Melluish, Partridge, Ruckgaber, Sager, and Tilley. John Tilley was in fine fettle and the life of the party. The presence of Reverend Father Partridge was a pleasant surprise. He is taking a respite this winter from his missionary journeys and is living in Brooklyn near his daughter. He decided that a winter in the North would be beneficial to a lame condition which he had developed. He was asked to say grace at the beginning of the dinner, and when the party broke up all stood for a few brief moments in memory of those members of the Class who have departed, and Father Partridge gave an appropriate blessing. It was midnight when the crowd finally broke up reluctantly. Dorrance had promised to come on from New Haven, but a wire was received from him during the dinner stating that a serious railroad fire in Providence called for his presence and prevented him from coming to New York. The fire made him miss not only the dinner but also a trip to Pinehurst which he had planned for the week end. Charlie Trout was kept away by the celebration of a wedding anniversary that day. Arthur Baldwin sent his regrets from Virginia. Regrets were also received from Steve Crane, Freedman, Charlie Lawrence, and Rutherford. Other classmates around New York who were notified of the meeting but who sent no reply were Ralph Allen, F. W. Andrew, J. F. Gayler, C. H. Hall, C. P. Lynch, George McElroy, Russell Starr, Harold Stevens, and Ed Sturtevant.

A recent communication from Wayne in Indianapolis indicates that now he is retired, he is finding time to go through

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1896 Continued

his inherited treasures. In doing so he came across a sample of native paper labeled "Sandwich Islands," which had probably been obtained by his grandfather on one of his foreign voyages as an old-time sea captain. The Secretary submitted this sample to Dard Hunter, curator of the Dard Hunter Paper Museum at M.I.T., who recognized it as a product from the inner bark of the paper mulberry tree but said that because of certain characteristic marks it must have come from Tahiti or Marquesas Islands and not from the Sandwich Islands. It now reposes in the Dard Hunter Museum at M.I.T.

Lou Morse was at M.I.T. on February 21 for the purpose of interviewing student candidates to enter the employ of the York Ice Machinery Corporation. He was busy every minute of his stay, so that the Secretary was able to contact him only by telephone.

In accordance with the vote of the Class, the Secretary has paid to the M.I.T. Athletic Association our annual contribution of fifty dollars for the benefit of athletics during 1941.

The death of Gurney Callan has been reported previously, but it is of much interest to note that the February issue of the *Bulletin* of the Harvard Business School Alumni Association contained a very high tribute to him as a man and as a teacher, printing an excellent likeness of him sitting at his desk and giving him the citation of "philosopher in engineering, humanitarian in business, inquiring mind in teaching, tolerant perfectionist." It is significant of the affection of his students that he was referred to lovingly by them as "Daddy Callan."

Lloyd Wayne has sent clippings about William Guy Wall, who passed away in Indianapolis on January 16. Guy was born in 1875 in Baltimore, Md., the son of William E. and Mary C. Dade Wall. He married first, in 1909, Minnie Tyndall Morrison, who is deceased, and he married second, in 1934, Helen Wessel. There was one son, who died. After graduation Wall went with the southern agency of the General Electric Company in Charlotte, N.C. In 1898 he was electrical and mechanical engineer and manager of the electrical department of the Smith-Courtney Company, Richmond, Va. In 1900 he became associated with the newly organized National Motor Car Company as mechanical engineer and designer, and later became vice-president and chief engineer and continued until the organization went out of business. He then opened offices in the Merchants Bank Building in Indianapolis as consulting automotive engineer. He retired in 1939, but last August was called back to Federal service for special work in the Ordnance Department, and had been living on his old estate "Walldene," at Boyds, Md. His death came suddenly after a heart attack. Guy was originally a graduate of the Virginia Military Institute and had always been interested in military affairs. He took part in the Spanish-American War as first lieutenant in the North Carolina Infantry, and later in the World War held ranks of major, lieutenant colonel, and colonel. From June, 1917, to February, 1919, he was in the Ordnance Reserve Service. He was ranking officer on the board for caterpillar gun mounts. In March and April, 1919, he was with the first British army in the German drive, taking part in the Somme defensive and in action at Lys. He was later with the French sixth army on the Aisne. He was a member of the American Legion and secretary of the Legion's Endowment Fund Corporation. He was a member of the American Society of Mechanical Engineers, the Army Ordnance Advisory Board, Woodstock Club, Army and Navy Club in Washington, the Manor Club in Boyds, Md., the Potomacs Hunt, the Traders Point Hunt, the Indianapolis Gun Club, Indianapolis Athletic Club, and the Indianapolis University Club. While in the automobile business he built in 1912 the famous National forty automobile which won world-wide recognition on account of many stock car racing victories. He built the first six-cylinder car on the American market, and also the National 12-cylinder car marketed in 1915. He is survived by his widow, two sisters, and two brothers. — A later newspaper clipping from Wayne referred to the probating of Wall's will and stated that there was no estimate of his estate but specific bequests totaling at least $170,000 were listed in the will. The major part of his estate and a $50,000 trust fund were left to his widow. There was a gift of $10,000 to the Indianapolis Flower Mission in memory of his first wife, $1,000 to the vestry of St. Peters Episcopal Church at Poolsville, Md., and other bequests totaling $59,000 to friends and other relatives.

At the midwinter meeting of the Boston Alumni in Walker Memorial on February 27 the '96 men who ate together were Fred Damon, P. B. Howard, C. E Locke, and John A. Rockwell.

Don't forget our forty-fifth anniversary to be celebrated at East Bay Lodge, Osterville, Mass., on Thursday, June 5, to Sunday, June 8, inclusive, followed by Alumni Day at M.I.T. in Cambridge on Monday, June 9. CHARLES E Locke, *Secretary*, Room 8–109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1898

Never a long period goes by without the clipping bureaus' furnishing us with a life history of Roger Babson, internationally known statistician, business commentator, and financial adviser. This time it is the Westhampton Beach, N.Y., *Hampton Chronicle*, which tells of his rearing in the old-fashioned atmosphere of hard work and of his lifelong insistence on the importance of religion in business. We who knew him so well can afford our little joke, but we are very proud to find that wherever we go in this country, or in fact in any country, he is well known and his opinions are treated with the highest respect. — Other than this no news has been received during the last two months.

The following new addresses have come in: Charles H. Godbold, Bureau of Ships, Navy Department, Washington, D.C.; Julius E. Nolte, 36 Meeting House Lane, Scituate, Mass.; Frank I. Peckham, Lovell, Maine; and Ralph E. Wilder, 135 Lexington Avenue, Syracuse, N.Y.

The following deaths have been reported: Thomas F. Carroll, United States Veterans Administration Hospital, Bronx, N.Y., on February 7; John B. Dixon, Glens Falls Portland Cement Company, 36 Lincoln Avenue, Glens Falls, N.Y., on December 12; and George E. Mathews, Sier Hill, Norwalk, Conn., on October 13. — ARTHUR A. BLANCHARD, *Secretary*, Room 4–160, M.I.T., Cambridge, Mass.

1900

The monthly meetings of the Alumni Council are well attended by members of this Class. Charlie Smith represents New Haven; George Russell, Panama; Stanley Fitch, Seattle; Percy Ziegler, Manila; Elbert Allen, Atlanta; and the Secretary, the Class. Patch and Stearns have been recent guests. Sperry and Stratton attended the October meeting of the Washington Society of the M.I.T., and Morris and Stratton the November meeting.

We note that George Mead is mentioned in the February issue of The Review in the article "From Logs to Riches," by J. N. Stephenson, as being the vice-president of the Lake Superior Paper Company, which built the first newsprint mill in Canada designed and constructed by an American engineer. That's going back a long way, George.

Walworth writes: "Business problems have taken almost my entire attention since 1930, and the most interesting of these problems has been the development of the Valean fin tube radiator at Hartford, Conn., for streamline railroad coaches and Pullman cars. For recreation I continue to be an undiscouraged amateur farmer at Barre, Mass. I say undiscouraged because, in spite of the hurricane that nearly wiped us out and in spite of an unprofitable lumber operation, we have a new barn, cows in the pasture, a small stream of milk flowing, and a place where we would welcome the visit of any '00 classmates on summer week ends. My wife also has a hobby — collecting sea shells and designing costume jewelry with these. Of course I tag along on many short trips to the beaches, one of which trips ended most happily at East Bay Lodge with the Class."

One matter which has escaped us of late is the class contribution to the Alumni Athletic Fund. Other Classes have shown material interest in the conduct of Technology's unique athletic system, and it is hoped that this Class will assist in maintaining this deserving department. Any contributions which members of this Class care to send to the Secretary will be credited either to the individual or to the Class.

Some of the recent address changes are: Fred B. Wilder, Lockwood Apartments, 4363 Lockwood Avenue, Los Angeles, Calif., Leo W. Standish, 204 Jackson Street, Newton Centre, Mass.; Brackley

1900 Continued

A. Shaw, 1199 Essex Avenue, Montreal, Canada; Harry E. Osgood, Henniker, N. H.; and James T. Harahan, Barbizon Plaza Hotel, 101 West 58th Street, New York, N.Y. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

1901

The so-called flu epidemic caught up with your Secretary just as class notes were due to be prepared for the March Review. Hence those notes will now be combined with these for April.

More than sixty replies have already been received to the annual class letter sent out on November 26, and the majority signified the intention of attending our fortieth reunion relative to which full particulars should be received by special letter before the receipt of this April Review. Many of the affirmative replies were short of news, which we anticipate evidenced the intention of bringing some good news to the reunion. However, from various sources we have gleaned certain interesting items which can now be released through these notes, viz.: Carl Johnson, our pal of the good old days at Tech, is now actively using not one but two airplanes in connection with his business and during the last twelve years has covered most of the United States, Canada, and Mexico. Carl described some of his experiences, and two episodes which might have resulted fatally are quoted as follows: "Have had a number of forced landings, one of which was caused by stoppage of the gasoline line to the motor due to someone's putting a quart of sand in my gasoline tanks. Once, while flying blind in Mexico, I was forced to land about twenty-five miles from Mexico City to get my bearings, as there were no navigational aids — not even a workable map — there at that time. I landed in a plowed field at an elevation of 7,400 feet after flying for over an hour at 16,500 feet without oxygen. Landed near an Indian village and I thought the natives would wreck the plane before I got out. They pounded the ship on all sides, worked the rudder and flippers, crawled under the ship and pounded the landing gear with stones to see what it was made of. To cap the climax, the young sprouts carried on a sham battle, lining up on opposite sides of the plane and throwing stones and dirt at each other; any one of the stones might have gone right through the fabric, and repairs there would have been difficult. I was lucky to get away with but the loss of my field glasses, which they appropriated."

So if Carl does not fly to attend the reunion, we are going to be mightily disappointed, even if it does mean a trip from Zephyr Cove, Lake Tahoe, Nev. (elevation 6,225 feet), where he makes his home, or from Los Angeles, Calif., where he has his business address at 126 West 6th Street.

Jack Eveland writes from Reno, Nev., where he is now making his headquarters (address Post Office Box 2367) as mine geologist-engineer and consultant in connection with the examination of mines and the supervision of mining operations for various eastern interests. Jack says he hasn't seen an '01 man in years, so he should surely come East next June and get re-acquainted at the reunion, even though he mentions that both he and his family like Reno.

Another Far Westerner who hopes to come to the reunion is Ed Fleming, who is in charge of the smelter research department of the American Smelting and Refining Company, Salt Lake City, although he gives his residence as 4057 Leeward Avenue, Los Angeles, Calif.

R. R. M. Carpenter, Vice-President and director of E. I. du Pont de Nemours Company of Wilmington, Del., sent in no news, but we note from an interesting news item in the *Christian Science Monitor* that last fall R.R. headed an expedition to Alaska for the Philadelphia Academy of Sciences, of which he is trustee. To quote from the *Monitor* article: "the group went by boat from Seattle to Ketchikan, chartered a plane to Juneau and caught another for Fairbanks, arriving there early last fall. Accompanying Mr. Carpenter were Mrs. Carpenter, Ernest Miller and Harold T. Green, Curator of Exhibits at the Academy who was to study the terrain, foliage and other details of the home of the Dall Sheep, or 'Silver Ram' as Ernest Thompson Seton has called him.

"According to Mr. Green, base camp was established where the Cody Creek joins the Wood River, at a point on the edge of timber line. 'Near by, on dizzy cliffs and long steep slopes where gravity exerts its mightiest to dash anything loose down hundreds of feet, the Dall's sheep enjoy an almost unmolested existence,' he said."

We, therefore, judge that the adventure must have proved both interesting and exciting and suggest that when we grow tired of discussing whether we should "lend or give aid" or perhaps just run in order to escape prospective bombing, we buy up a small part of the mountain habitat of this "Dall Sheep or Silver Ram" and thereby find real peace and quiet.

We have recently learned that Ted Taft, who is associate professor of heat engineering at M.I.T., holds the commission of lieutenant commander in the United States Naval Reserve in connection with a special course for naval officers sent to M.I.T. to study the theory of the torpedo power plant. One of Ted's outside associations also sounds interesting, since he is vice-president and chairman of the program committee of the Plant Engineers Club of Boston. This is a limited group of thirty men from large industrial plants in that vicinity and is organized on the Rotary Club plan — one representative only from each type of industry. A monthly dinner and discussion of pertinent subjects proves of immense value to the members. This idea might have many applications in various branches of engineering. Ted says he is planning to attend the reunion and we hope nothing will interfere.

Alberto Gonzales, III, who writes that he cannot attend the reunion, says that while his principal occupation is engineer with Cia Mexicana de Gas, S.A., at Monterrey, N. L., Mexico, he has time to do some outside work as private engineer. He states also: "In the current year I have been a member on the board of directors of the Sociedad de Ingenieros y Tecnicos de Monterrey (an engineering society founded in this city). Recently have been appointed by the state government as member of the board for evaluation of urban real estate representing the interests of the chamber of proprietors. In my private life I am glad to say that I am the proud grandfather of a second grandson."

We, therefore, hope that the grandsons are already heading for M.I.T. and that Alberto will come to our forty-fifth reunion even if he cannot connect with the fortieth.

A. H. B. Jeffords advises that he is assistant management consultant for the Trundle Engineering Company, Bulkley Building, Cleveland, Ohio, and, we are glad to state, indicates he is planning to be at the reunion.

Fred Clapp informs us that "strange as it may seem," he has stayed in the United States for the entire year. Apparently he has found that some money can be made in the oil business in Oklahoma and Texas, so we cannot understand why he is not planning to attend the reunion. Surely the (to him) comparatively short trip east should seem only like light exercise, so whoever knows Fred best should make certain he is to be present.

Al Sulzer, who is vice-president and assistant general manager and director of Eastman Kodak Company at Rochester, N.Y., was, early last year, appointed a member of Governor Lehman's New York State Council of National Defense. He was also appointed chairman of the Visiting Committee on the Department of Mathematics at M.I.T. Al says he would like to attend the reunion, but cannot be sure yet. However, we *calculate* that Al, as Chairman of the Visiting Committee on Mathematics, ought to *figure* out some way to be in or near Boston on June 7, 8, and 9.

Other news items will be chronicled seriatim in the May Review in the order in which received. However, it is now in order to note that the Alumni Office has recently furnished information regarding two classmates, Isaac D. Bardin and Prescott H. Cummings, whose addresses have been missing for many years. Isaac Bardin is stated to have died on July 9, 1940, while Prescott Cummings is reported to be now located at 518 Marlborough Avenue, Detroit, Mich. Nothing having been heard about either of these men for so many years, we hope some additional information may be furnished by someone who has kept in touch with them during the years gone by. — ROGER W. WIGHT, *Secretary*, The Travelers Fire Insurance Company, Chapman Building, Portland, Maine. WILLARD W. DOW, C.P.A., *Assistant Secretary*, 20 Beacon Street, Boston, Mass.

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1904

As you all probably discovered, there were no '04 class notes in the February issue of The Review. I did not have any material from which to write. There is not much available for the April issue, but there is just enough to let you know that the Class is still around.

Recently I received the 1940 edition of the directory of the Technology Club of Chicago, a very excellent production of about one hundred pages containing much information about the Club and its members. From the book it appears that L. H. G. Bouscaren, Vice-President of the Stone and Webster Engineering Corporation, was President of the Club and that Joseph B. Finnegan, professor of fire protection engineering at the Illinois Institute of Technology, was a member of the executive committee of the Club. Other '04 men among the Club members are H. K. Chapin, L. C. Clarke, W. E. Hadley, G. B. Harrington, J. L. Hecht, C. F. Hunter, M. E. Mason, G. P. Palmer, R. S. Phillips, G. M. Proudfoot, W. F. Rech, M. H. Schwartz, A. D. Smith, A. G. Snydacker, A. C. Willard, and S. T. Worcester.

The annual reunion of the Class will be held at Boxwood Manor, Old Lyme, Conn. The tentative dates are June 27, 28, and 29. Full details will be forthcoming later. Do not forget Alumni Day at the Institute on June 9, and, if you are in the vicinity, plan to attend. There are always several '04 men around on this occasion and we have an enjoyable time.

As Ethel Barrymore would say, "That's all there is; there isn't any more" notes for this issue. — HENRY W. STEVENS, *Secretary*, 12 Garrison Street, Chestnut Hill, Mass. AMASA M. HOLCOMBE, *Assistant Secretary*, 4817 Woodway Lane, Northwest, Washington, D.C.

1905

The high light of the winter for Boston '05 men was the meeting at Sid Strickland's home in Brookline on Tuesday, January 28. Inveigled by the thoughts of the well-advertised Andy Fisher quahog chowder, fifteen fellows gathered early for an appetite-limbering half hour. Present were Harry Donald, Bill Ball, Carl Graesser, Hub Kenway, Al Dickerman (from far-away Providence), Irving Cowdrey, Al Prescott, Grove Marcy, Prince Crowell, Sam Shapira, Ed Barrier, Wesley Gilman, and, of course, Andy, Sid, and the Secretary.

After a rush trip to Cape Cod to dig for quahogs, Andy returned early to assemble the necessary ingredients, including plenty of MacBriar's Carnation Milk, for a Fisher chowder. All assembled camp-fashion around a long table, from the centerpiece of which Andy proceeded to dish out seconds and thirds until the huge pot was empty. Someone was unkind enough to say this was a compliment, because "he didn't like the darn stuff," but the smiles on the faces of the tigers belied the dirty dig. Pies, cheese, and so on topped off the meal, after which we adjourned to Sid's study and cellar to see and hear the story of '05's famed archaeologist. We cannot here give space to the story as written by the Boston *Transcript* (see issue of Monday, January 13, which shows Sid's picture and part of his collection), but we did have a very intimate inside story of a mighty interesting research carried on by Sid for several years around historic Plymouth. Among his excavations were old wrought-iron implements and handmade bricks and dishes. He also had a reproduction of the old Plymouth Colony made in minute detail by his son, Charlie.

Adjourning to the living room, Carl brought forth a roll of colored film taken at the thirty-fifth reunion at Old Lyme last June. Prince Crowell had his projector, but after a brief huddle by the film experts it was decided that it was impossible to run a sixteen millimeter film on an eight millimeter machine, so the showing of '05 reunion antics was postponed until said authorities can get together on the proper equipment. By the way, the Secretary has borrowed the film and had a reproduction made in color, which New York, Chicago, Philadelphia, Washington, or other '05 groups may take on guarantee to show to an '05 audience of five or more.

Prince then showed some of his own colored film including his family (accent on grandchild), his summer home, and some class CC boat races. Missing because someone had borrowed them were pictures of the CC championship of last summer, which (no kidding) was won by Prince. He admitted it, but stated that just before the race the boat was dry-docked, and the coat of paint applied by Andy in the spring was removed and replaced by a smooth coat. The meeting adjourned with the unanimous opinion that it was one of the best winter meetings ever.

One subject briefly discussed was the meeting place for our 1941 reunion, and the Secretary was instructed to endeavor to ascertain through class notes whether there was any desire on the part of those attending during the past six years to convene at some point on Cape Cod rather than at Old Lyme, Conn. In the absence of an appreciable sentiment for the former, the reunion will take place at Old Lyme on June 6, 7, and 8.

Two deaths have occurred since our last report. LeBaron Turner, I, died at Geneva, Ill., on January 21, and Donald R. Battles, XIII-A, died on January 20. While we have not been able to get any details of the late life of Turner, everyone remembers him as the long, lanky, good-natured fellow who used to win honors for the Class and M.I.T. on the cinder track. He was president of the United States Wind Engine and Pump Company of Batavia, Ill. Besides his wife, he leaves a son and two daughters. — Battles came to us during our junior year, after being graduated from Annapolis, where he tied for first place for scholastic excellence. After engagements with the General Electric Company, Carnegie-Illinois Steel Company, and the Fore River Yard of the Bethlehem Steel Company, he went to the Electric Boat Company at New London, Conn., in 1918. At his death, he was assistant to the vice-president. He held the rank of commander in the United States Naval Reserve. He leaves a widow, one daughter, two sons, and two grandchildren. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 75 State Street, Boston, Mass.

1906

Readers may recall that in the fall of 1939 the Secretary referred to the fact that reservations were made at the Oyster Harbors Club for our reunion in 1941. In the meantime, some of the members of the Class have expressed the opinion that we would have a greater attendance if we selected a less formal spot for our gathering. On that account the plans just now are still uncertain except as to the dates, which will be the two days before Alumni Day, namely, June 7 and 8. If these dates are not already reserved on your calendar, hesitate no longer; reserve them now.

Frank A. Benham, I, was elected chief engineer of the New England Telephone and Telegraph Company in February. Frank entered the engineering department of the company immediately after graduation and has done outstanding work in all phases of telephone engineering. Previous to his last promotion he was engineer of plant extensions and was responsible for the engineering of the new exchange and toll plant. In recent months he has been very active in connection with the telephone facilities necessitated by the National Defense Program. He lives in Arlington, where he is on the town finance committee. He is an enthusiastic golfer and held the Class championship from 1931 to 1936, when the honor went to Allyn Taylor, II. Frank will make a strong bid to regain his laurels this year.

The Tulsa, Okla., *World* of December 8 recorded a discussion at the University of Tulsa upon the subject, "Make America Safe for Differences." One of the participants was Michael J. Ahern, XII, who is head of the geology and anthropology department at Weston College, Weston, Mass. Ahern stopped at Tulsa on his return from the Southwestern Institute of Human Relations held at Dallas, Texas. — We'll see you in June! — JAMES W. KIDDER, *Secretary*, Room 802, 50 Oliver Street, Boston, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills, Mass.

1907

Clayton Rhay Denmark, II, died on December 22. Clayton never manifested any interest in class or Institute affairs, and I was never able to obtain from him any reply to numerous requests for information. On learning of his death, I wrote, on behalf of our Class, a letter of sympathy to his widow and received from her on February 1 one of our class statistics sheets and a nice note. From 1909 until the time of his death he was chief engineer at the Smithsonian In-

1907 Continued

stitution in Washington, D.C. At various times during his career he supervised the installation of heating and ventilating systems in the Pittsburgh courthouse, the House of Representatives office building in Washington, the Freer Gallery of Art in Washington, the new National Museum in Washington, and also was consultant on numerous jobs of heating, refrigeration, and ventilation, including the ventilation in the Capitol in Washington. Clayton was born on September 9, 1883, at Quitman, Ga., and prepared for the Institute at Mercer University, Macon, Ga. He was married in 1917. His widow lives at 408 Aspen Street, Northwest, Washington, D.C. There were no children. Mrs. Denmark's note follows: "I have tried to give you the desired information about my devoted husband. . . . Because of my illness (I have been an invalid for twelve years) Clayton gave up all activities and devoted all of his time, outside of his daily work at the National Museum, to my welfare and happiness. He always was notably quiet and retiring in disposition, devoted to his profession and to me, caring little for worldly acclaim. I take just pride in saying that his character, personal life, and professional achievements were worthy of honor. Just before his death he received a letter from Dr. Abbott, secretary of the Smithsonian Institution, saying that he was so necessary to the government that he hoped the time would never come when he would have to appoint someone in his place . . ."

On February 6, I had the very real pleasure of chatting with Rutherfurd Bingham, VI, at his suite in Hotel Charlesgate, Boston, where I learned he was living for a few months to be near his son, a student at Harvard, who had suffered a rather severe accident. It was particularly satisfying to me to have this interview, because Bingham's whereabouts were entirely unknown to either the Alumni Office or to me for several years, and because I had never been able, even after his address was learned, to secure a reply to letters. He was extremely cordial and delightful, and for over an hour entertained me with tales of some of his experiences. He had several connections after graduation from the Institute, and then entered the United States diplomatic service in February, 1911, and continued actively there until November 1, 1919, although it was July, 1920, before he actually resigned. He served as legation secretary in Quito, Ecuador; Vienna; Copenhagen; and Havana and for about two years was in Washington. In the fall of 1919 he became associated with the Standard Oil Company of Bolivia as the result of his diplomatic experience and his ability to speak Spanish. He was the contact man between the Bolivian government and the company, his particular job being to secure concessions of oil fields from the government, but he was also in charge of all of the company's organization in the territory, including medical and commissary departments as well as engineers and laborers. After two years in Bolivia he had similar duties from 1921 to 1924 in Venezuela. In 1924 he and his wife, who was the daughter of Theodore P. Shonts, President of the Interborough Metropolitan Railroad of New York from 1907 to 1919 and President and director of many railroads and trust companies, inherited a large amount of money and property, including a big farm in Newtown, Bucks County, Pa. Rutherfurd retired from active business life, and has lived on this farm ever since. He takes no interest in any kind of college or social connections but devotes his time to raising crops and to cultural pursuits. His wife died in 1931, and the twenty-two-year-old son previously mentioned is his only child. Rutherfurd served as a captain in the Eighteenth Pennsylvania Infantry in 1917.

Many of you will remember John Mather, who came to Technology from Lowell, Mass., took Course VI, and was a lieutenant in our freshman corps of cadets. By a mere chance I learned in February that he was located at Watertown Arsenal, Watertown, Mass. He is a colonel in the ordnance department of the United States Army and is in charge of production at the arsenal. I spent a most pleasant hour with him at his office on February 14. John left the Institute in January of 1907 and after working for a few months with a cable company in Bridgeport, Conn., went to Fort Leavenworth, Kansas, and took Army competitive examinations at just about the time that Johnnie Thomas, George Norton, and Chick Eaton were doing the same thing. Mather received his commission as lieutenant in 1908, and has risen in rank to his present grade, having been a colonel since 1937. Until 1920 he was in the artillery; since then in ordnance. He served overseas as lieutenant colonel in the 60th Artillery (heavy) from April, 1918, to May, 1919, and was in the office of the Chief of Artillery, general headquarters, in charge of instruction of heavy artillery units, during the Meuse-Argonne offensive. During the winter of 1920–1921 he was assistant professor of military science at the Institute. John looked splendid, — much as I remembered him in undergraduate days, except that he has much less hair and considerably more weight. He has three children: a married daughter who lives in Columbus, Ohio; a daughter who is a student at Wellesley College; and a son who attends Browne and Nichols School in Cambridge, Mass.

I met Winslow D. Robinson in Boston on January 27 and had quite a chat with him. He continues to carry on successfully his own general insurance business, with office at 110 Milk Street, Boston. Robbie is quite a striking looking gentleman with his ruddy face and plentiful supply of white hair. His oldest son is teaching mathematics in New York, his second son is now a senior at Boston University, and the youngest son is in Newton High School. His only daughter, married in 1939, has a son.

In *This Week* of January 12 appeared a photograph and article concerning the activities of Emory Scott Land, Rear Admiral, United States Navy, and chairman of the United States Maritime Commission. Jerry, as he is affectionately called by his Annapolis classmate, James Reed (see '07 notes in the February, 1940, Review), is our classmate, as both he and Reed received S.M. degrees from Course XIII-A in 1907. Jerry was one of the original members of the Maritime Commission when it was created in 1937. Early in 1938 he succeeded Joseph P. Kennedy, the first chairman. Prior to his appointment to the commission in 1937, Jerry was chief of the Bureau of Construction and Repair, and most of his service in the Navy was as a naval constructor — a planner, supervisor, builder of ships. According to the magazine article, Admiral Land conceived the idea of convertible ocean liners to serve for passenger duty during peace, for combat duty with the Navy if war should come. Two of these are about to be built. "They will symbolize both the rebirth of the United States merchant marine and its important part in our national defense program. They will also be monuments to this go-getting admiral, whose down-to-earth methods are largely responsible for the fact that the American merchant marine today is staging a sensational comeback. . . . He has been the spark plug of the program under which approximately a merchant ship a week is now slipping off the ways."

On February 22, Eleanor Rand, younger daughter of Bob Rand, was married to Walter E. Faithorn, Jr., of Chicago, in the All Saints Episcopal Church, Belmont, Mass., the town in which Bob and his family have their home. The couple will live in Detroit. Bob is sales manager for the Bethlehem Steel Company in Boston, with his office at 75 Federal Street. He has been with this concern or one of its subsidiaries since 1924. His older daughter, Elizabeth, is married to Robert L. Richmond and lives in Bronxville, N.Y. — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The fourth and last get-together dinner of this season will be held at Walker Memorial on Tuesday, May 13, at 6:30 P.M. Previous meetings have been well attended, and I am sure you will have a good time if you come to the May dinner. Joe Wattles, who gave us such a fine showing of Kodachrome colored stills at our January dinner, has agreed to show some new ones at the May dinner.

The death of Burton W. Cary on December 6 came as a great shock to his classmates. Burt died at Norwalk, Conn. while en route to Florida. He was president of the Clifford Manufacturing Company of Boston and a director of the Graton and Knight Company of Worcester, Mass. He was active in the affairs of Winchester, Mass., where he lived, having held membership on the town finance committee and the school committee.

Please turn to page I for information on Alumni Day, June 9

1908 Continued

The following letter to your Secretary has been received from Jimmy Burch, treasurer of Farley and Loetscher Manufacturing Company, Dubuque, Iowa: "It was saddening to me to see the notice of Burt Cary's death in the Technology Men in Action section of the February Review. I was very fond of Burt and enjoyed the association with him all through the four years at Technology. Needless to say, the reunions will not be the same without him. We shall miss his cheery way and his good fellowship. — I think you and Caldwell should be congratulated on each having a son in the Class of 1944. I cannot compete with you, as I have just the one daughter, Mary Juno Burch, and she was married on November 14, to Frank Russell Patch."

Word has also been received of the death of Paul E. Fernald on January 8 at Fort Lyon, Colo. He was a mining and civil engineer, active in southern Arizona for more than twenty-five years, and was formerly part owner of the Legend group which included the Tres Amigos, Dos Amigos, and Oro Blanco mines. He had been connected with the Banner mine in the Papago mining district of southern Arizona, first as manager and later as owner. From 1931 to 1936 he served as city engineer of Tucson, Ariz.

It is with regret that we report the death on February 16 of Ralph Eric Manning at his home in Wyncote, Pa. Manning was vice-president and secretary of the Philadelphia Manufacturers Mutual Fire Insurance Company, had been connected with the Associated Factory Mutual Fire Insurance Companies for most of his business life, and had served overseas as an officer in the Army Fire Protection Bureau. His absence at class gatherings will be greatly felt. — Belated news of the death of Waldo P. Druley at San Diego, Calif., on July 1 has recently been received. — The sympathy of the Class is extended to the families of these classmates.

A letter dated February 10 from Linc Mayo reports that he and his former partner were expecting to leave for Florida to be gone until after the first of April. Linc looked forward to escaping the wintry weather of the North. He reports that the Class is still solvent, having something over $100.00 in the bank. — Walter E. Poor has been made executive vice-president of the Hygrade Sylvania Corporation, producers of fluorescent and other lighting equipment.

Mat Porosky, Vice-President in charge of sales of Eagle Signal Corporation, presented a very interesting and thorough paper on "Flexible Progressive Traffic Control Systems," at the forty-fifth annual convention of the International Municipal Signal Association at Jacksonville, Fla. This paper has since been published in *Municipal Signal Engineer*.

A word of greeting to Cookie from Ralph J. Batchelder in Pasadena, Calif., has been received. Batch reports that for the past year and a half he has been associated with the Metro-Goldwyn-Mayer Studio, designing sets. Previously he was occupied with the designing and supervising of the buildings for the 200-inch telescope at Palomar Mountain — observatory and fourteen other buildings — handling the drawing, superintending, and buying of materials.

An interesting letter to Cookie from William Alexander Adams in Shanghai, China, describes his work and life on the other side of the world. We quote in part: "Living in Shanghai is like living no place else in the world. We have a war going on and pay no attention to it, and of course every nation in the world is represented here. You can meet any sort of a nationality here — English, German, Italian, Bulgarian, Hungarian, French, Swiss, Argentine, Brazilian, Mexican, Rumanian, Russian, Yugoslav, or take your pick. And we all live together in peace and do business with one another profitably."

We have the following changes of address to report: Frank K. Belcher, 1622 Torrison Drive, Manitowoc, Wis.; Kenneth C. Boush, 66 33d Street, Newport News, Va.; Clarence W. Clark, Box 319, Fort Madison, Iowa; Mrs. Ruth M. Denny, Box 27, Route 1, Sonoma, Calif.; Joseph Florentine, Jr., Lamson Brothers and Company, 141 West Jackson Boulevard, Chicago, Ill.; Philip J. Hale, 3631 Fairmount Boulevard, Cleveland, Ohio; Daniel F. Harriman, 201–19 104th Avenue, Hollis, L.I., N.Y.; William R. Heilman, 2938 Magnolia Street, Berkeley, Calif.; Paul H. Heimer, 523 East Amelia Avenue, Orlando, Fla.; Ernest E. Kilburn, R.F.D. No. 3, Wilmington, N.C.; Frederick W. Lyle, R.D. No. 1, Irwin, Pa.; Stanley F. Nelson, Eustis, Fla.; Edwin M. Price, Black Oak Farm, Van Buren, Ark.; John R. Reyburn, 523 Old Post Road, Fairfield, Conn.; Harry F. Richardson, 61 North Monroe Street, Ridgewood, N.J.; Joseph B. Sando, 6315 Main Street, Kansas City, Mo.; Clifford L. Wade, 1921 East 85, Cleveland, Ohio; and Rudolph B. Weiler, 9 Green Tree Building, West Chester, Pa.

Don't forget the dinner on May 13. — H. LESTON CARTER, *Secretary*, 60 Batterymarch Street, Boston, Mass.

1909

This month there seems to be almost a complete dearth of news. At the time these notes are being written, our efficient Assistant Secretary, Paul Wiswall, is skirting the coast of Central America on one of the United Fruit Company's ships — the same one, in fact, on which he made such a pleasant voyage last year. Upon his return we shall look forward to an interesting account of the trip. — I understand that Tom and Alice Desmond left recently for Phoenix, Ariz., so this is apparently the traveling time for some members of our Class.

Recently Dan Belcher, looking hale and hearty, walked into my office, having come to Boston from Minneapolis, where he has been located for several years as a representative and vice-president of the Bemis Brothers Bag Company. Dan tells me he is now a grandfather, since a son, Cline Tincher, was born about a year ago to his oldest daughter, Carolyn.

Bion A. Bowman, a member of the firm of Fay, Spofford and Thorndike, is now stationed in Newfoundland where the firm is engaged in doing the engineering for a large army base for the United States Government.

Mex Weill reports that his daughter, Ruth Weill Strauss, has a son who was born on February 9. Mex thinks, "From all appearances he should make a good engineer — M.I.T., of course." — Just ran across George Gray, who is now living in Belmont, Mass., while he is working for the Signal Corps at the United States Army Base in Boston. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries:* PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

The following is from a recent issue of *Hotel and Restaurant News:* "Harold C. Manson of Rival Foods, Inc., has just returned from an airplane trip around the entire South American Continent, and made several interesting observations on foods. In the first place, these people in Latin-America are tremendous eaters. With the exception of breakfast, they eat enough in one meal, at noon or nine o'clock at night, to last the average North American for several days. They grow tremendous quantities and varieties of fruits . . . largely . . . bananas, oranges, and pineapple . . . and in Chile in addition they have grapes, peaches, pears, and plums. In Argentina and Uruguay they raise a tremendous number of cattle, and have especially fine beef. We had an opportunity of going through one of the big meat packing plants there and they told us that the average price they obtained on mutton is 1½¢ per lb., and beef 3¢ per lb. This is what the animals netted the packing house. On a picnic day in Uruguay, it is a very common sight to see people take a whole sheep, put it on a spit and build a fire beneath it, and a family of four or five consume the entire carcass . . . with several other varieties of food and drink during the meal. Coffee is produced in Colombia, Ecuador, Brazil, and Venezuela. Of course, Brazil is the biggest producing country — its area being larger than the United States. In fact, they produce so much that to ship 650 bags of coffee, they have to buy approximately 1000 bags and turn over 350 to the government — and at its discretion it is either burned or stored for future use. Foods of all domestic types are very cheap and cost but a fraction of what the cost is on the market here."

A copy of the 1940 bulletin of The Technology Club of Chicago has been received. The Club was organized on January 8, 1887, at which time it was called the "Northwestern Association of the Massachusetts Institute of Technology." It boasts of being the first Alumni Association of the Institute. Don Williamson is a member of the executive committee, and the following classmates are members: William Doerr, Walter Dray, S. A. Guthrie, Mrs. G. S. Hinckley,

1910 Continued

Harold Lockett, Fred Lufkin, Douglas C. McMurtrie, James H. O'Brien, George F. Salisbury, and Merrill W. Tilden.

The following excerpts are from the *Christian Science Monitor* of January 20 and supplement the notes of last month: "One of the great engineering adventures of defense production — the building of $40,000,000 worth of ships on a site now covered with forest — has fallen to Karl Fernstrom, a professor at Massachusetts Institute of Technology. . . . Said Professor Fernstrom, '. . . By June we aim to lay our first keel, if we can. We plan to turn out all the ships in two years.' This will be the only shipyard to be built entirely new to carry out President Roosevelt's program of 200 new cargo vessels, so far as the M.I.T. man knows. The company handling the job is the Newport News Shipbuilding and Drydrock Co., one of the largest ship building concerns in the country. For the 25 cargo ships it has set up a subsidiary, the North Carolina Shipbuilding Co., of which Professor Fernstrom will be manager. The new plant will be located on the Cape Fear River four miles below Wilmington, N.C. 'The merchant ships we build will be roughly 430 feet long with a 57-foot beam and a carrying capacity of between 8,000 and 10,000 tons,' said Prof. Fernstrom. . . . 'At the peak we shall employ about 4,000 men. Our site will cover 56 to 58 acres, and there is plenty more virgin soil adjacent if needed. . . . M.I.T. has given me a leave of absence for one year.' Prof. Fernstrom graduated from M.I.T. in naval architecture in 1910, and stayed on to teach in the physics department for two years. Then he went out into industry as assistant to the general manager of the Fairbanks Morse Co. at its main plant in Beloit, Wisconsin. Next, he went to a plate glass company, where he was superintendent. During the World War, he joined the Newport News Shipbuilding Company, to which he is now returning. One of his jobs was the fitting out of the ordnance and armament of the battleship Mississippi. Then he went into the plant engineering department, became superintendent of transportation, and after shipbuilding fell off under the disarmament program, was placed in charge of all locomotive and railway car building for the company, completing 10 years' service there. In 1925, he came back to M.I.T. to go into its economics department, and later became a full professor of Business Management in M.I.T.'s Department of Business and Engineering Administration."

Your Secretary received a letter from Professor Herman R. Kurrelmeyer, telling of the passing of Herbert Gott on January 29. It seems sad that we did not know while he was alive of this classmate's endeavors for his fellow man. Then we would have been able to tell him of our pride in having him as a friend and classmate. It is indeed sad that a man of such character had to die so early, when he had so much to live for. The letter follows: "Herbert Gott entered M.I.T. in 1906, and after leaving Technology he went to Philadelphia. In 1914 he returned to Boston to work at 'social engineering,' especially Y.M.C.A. work with boys. In the fall of 1916, he came to me and said, 'Doctor, I'm going right into hell. The idea of the sufferings of the thousands and tens of thousands of prisoners of war in Russian camps will not let me rest.' He went by way of Leningrad. In 1917 his wife and twin babies had to go via Japan and Siberia in order to join him, as the Bolshevik Revolution was in full blaze in European Russia. At the time he had six Siberian camps in his charge, with 150,000 prisoners. He told me casually that he had gone through four revolutions. Traveling on the railroad one day, he got a telegram that Blagoveshchensk, where his wife and babies were, was being shelled by the Red Army. He got off, returned at once, and went to the Red general, bluffing him with the threat of a Japanese and American Army if he were kept from crossing on the only existing railroad bridge. At noon the batteries took time off for dinner, and Gott crawled over on the railroad ties. When he wanted to leave the next day, the bridge had been destroyed. They managed, however, to drift across the river on a steamer whose machinery was partly disabled. After peace came, he went to Estonia, to Revel, now Tallinn. There he faced the problem of four antagonistic nationals, Balts, Russians, Estonians, and Letts, batting each other worse than the two sections of Ireland. He succeeded in getting them to work together and established the first European Y.M.C.A. which was self-supporting. The University of Dorpat gave him the degree of doctor of humanities, which was richly deserved. About 1930 he came to the United States for a conference and spoke before the Technology Christian Association. At the time he told me of the Estonian climate and of the eight-hour sunlight a month in the winter; also, how depressing the dark, damp, chilly days and nights were. The climate got him; he developed tuberculosis and had to quit about 1935. He spent about two years in Lausanne and Austrian health resorts before he became strong enough to attempt coming home to the United States. Physically feeble but mentally alert and lively, he went first to Arizona, and then settled at La Jolla, Calif. At Christmas, he wrote that he was coming along fairly well, that he was writing, and so on; so it was a shock to learn of his passing away. If a man ever gave his life for his fellow men, it was Herbert S. Gott." — HERBERT S. CLEVERDON, *Secretary*, 46 Cornhill, Boston, Mass.

1911

Plans continue apace for what gives promise of being one of our most popular and best-attended reunions yet — the thirty-year reunion at the Mayflower Hotel, Manomet Point, Plymouth, on June 6, 7, and 8, culminating on June 9 in Alumni Day 1941 at the Institute through the day and at the Hotel Statler in the evening. At this late February writing we already have five classmates who to date have been unable to attend one of our reunions, but each of whom is planning to attend this year: Cal Eldred, VI, Ike Hausman, I, Cap Maguire, I, Jim Pierce, X, and Bill Warner, I. Two events stand out in bold relief as "can't miss": the class banquet on Saturday evening and the Sunday dinner, followed by the class photograph. Ted Van Tassel and the members of his general committee, Jack Herlihy, O. W. Stewart, Emmons Whitcomb, and ye Sec, are busy working out details, and shortly after the appearance of these notes you will receive the big reunion announcement with sign-up slip enclosed. That's *your* cue to "write to Dennie" and return your registration at once.

Along with the glad tidings from classmates, which accompany dues payments, grim tragedy occasionally stalks. So it was when a letter addressed to Joe Dunlap, II, for years with the Goodyear Tire and Rubber Company in Akron, came back marked: "Died March 4, 1940." At once getting in touch with Burgess Darrow, VI, an associate of Joe's, we received this reply which revealed the tragedy: "For several years now Goodyear has had a manufacturing arrangement with the British Dunlop Tire and Rubber Corporation, whereby in several countries where Dunlop has plants, Dunlop makes Goodyear tires, and, conversely, in some other countries where Goodyear has plants, Goodyear manufactures for Dunlop.

"One Goodyear man had been stationed at the Dunlop plant in India for about two years and was brought home for a year. Joe Dunlap was sent over in May, 1939, to substitute for the year, and before the year was up he was accidentally burned to death in bed. An autopsy showed that he was suffocated and then rather badly burned. He had been smoking in bed. His ashes were brought to this country after a number of months.

"Joe's position at the time of his death could be called, I suppose, manufacturing representative for Goodyear in India. Joe traveled a great deal in India, and some of the letters he wrote to his family, which I later saw, were very descriptive. He had spent most of the time since 1911 with Goodyear, with the exception of a short time of perhaps three or four years in the early '20's, when he was with another rubber company."

A letter of sympathy was immediately sent to Joe's widow and two children. A letter was also sent to Charlie Ashley, III, Resident Vice-president of the Maryland Casualty Company, 107 William Street, New York City, when word reached us of the death of his distinguished father, Charles S. Ashley, Sr., perennial mayor of New Bedford, Mass.

Our sympathy goes also to Art Coupal, II, whose mother passed away on February 1. Art is still at the Watertown Arsenal as principal gauge designer and is now living at 15 Governor's Avenue, Medford. Don Stevens, II, and his wife were called to Boston three days later because of the death of Mrs. Stevens's mother, so our sympathy also extends to Don's wife.

Please turn to page I for information on Alumni Day, June 9

1911 Continued

On January 30 the Department of Justice announced it had obtained indictments against six corporations in an attempt to "destroy unlawful foreign restrictions on the domestic production of magnesium for defense purposes." Classmates will watch this with interest, for our own Bunnie Wilson, XIV, is a notable figure in the magnesium production picture, and as Zim wrote me, "Even the innocent must defend themselves." Said the Associated Press: "I. W. Wilson, president of the American Magnesium Corporation and a vice-president of the Aluminum Company of America, said: 'The officers of the American Magnesium Corporation and the Aluminum Company of America are conscious of no violation of the anti-trust laws of the United States and confidently believe that a full presentation of both sides of this matter will reveal that there has been no wrongdoing whatsoever, but on the contrary that these companies have contributed greatly to the development of the magnesium business in this country. Expanding in the interest of national defense, these companies have multiplied their facilities for the fabrication of magnesium to more than 10 times peacetime demands and are now in the process of even greater expansion. These companies have co-operated to the fullest extent possible with the defense authorities of the United States and they will continue to do so."

Just a few days prior to this news story, Wilson had written me from Pittsburgh, when paying his class dues: "I wish I could be a little more optimistic as to the probabilities of my attending the thirty-year reunion next June. In order to do our part in connection with the national defense program, we are expanding facilities and organization to such an extent that the problems are constant and difficult, and it is very questionable whether I will feel able to take time out for the reunion. You may be sure that if this proves to be the case, it will be a great disappointment to me. If this reunion is half the success of our twenty-five-year reunion, no one can really afford to miss it."

Harold Babbitt, XI, writes that he's "still doing business at the old stand (faculty of University of Illinois), where you saw me when traveling in the '20's. . . . Class notes," he further observes, "contain boasts of grandfathers, but as a synthetic grandfather, both actual and potential, I claim to hold the class record. If all turns out as I hope, maybe I'll see you in June." — Royal Barton, VI, writes from New York (Ebasco Services, Inc., 2 Rector Street) that he is "already sighting on Manomet Point," and adds that he hopes "no fancy dress" will be the rule, which point I was quick to verify for him.

Stacy Bates, II, of Sheridan, Orr, Bates and Barnes, law offices, 306 Bank of America Building, Ventura, Calif., writes: "I have had the great event in mind, but what chances I have of making it I am unable to evaluate at the present time. My present feeling is that they are pretty slim, but on the other hand, much may happen in five months. Here's hoping!" From the Southwest, H. W. VanHovenberg, XI, sanitary engineer for the St. Louis Southwestern Railway at Mount Pleasant, Texas, says there is "just a bare possibility" that he can make it.

Jim Campbell, I, of Eadie, Freund, and Campbell, consulting engineers, 110 West 40th Street, New York City, says he and his wife have "high hopes and every expectation of making the reunion." In January, Jim was honored by re-election (second, not third, term) to the presidency of the New York Association of Consulting Management Engineers, an organization of consulting engineering firms in or near New York City. "Started about 20 years ago," he adds, "the association now has twenty-six prominent offices as members, and we are among the charter members. We are just finishing heating, ventilating, electric, and plumbing plans and specifications on Fort Greene housing, a city and state project near the Brooklyn Navy Yard, to contain 3,535 apartments. We also have chemical manufacturing and Diesel-electric power-plant work in the office." Glad you're so busy, Jim, and hope to see you in June!

Hearken to George Cumings, VI, Boston bachelor: "It's a good thing you sent me this dues bill before the income-tax people bled me. They do love a single goop like me! I'm planning to take in the whole reunion, as usual, and can see no reason now why I shouldn't do so."

We have just heard that Paul Cushman, VI, whose name has been in "American Men of Science" and "Who's Who in Engineering" for some time, now has his name in "Who's Who in American Education." He and his wife are definitely planning to be with us in June, you know.

Here in Worcester, Fred Daniels, VI, told me the other day that he would be in Canada on an annual fishing trip with business associates in early June, so cannot make the reunion, but Cal Eldred, VI, who was Fred's guest at a Rotary Club luncheon here in mid-February told me he hopes to make it, for it's just a hop, step, and a jump to Plymouth from East Walpole, where he is mechanical superintendent for the Hollingsworth and Vose Company.

From the Cosmos Club, Washington, D.C., Bill Foster, IV, sent in his class dues check and said that although "William Dewey Foster, Architect" is still on the door at 25 West 45th Street, New York City, he does not even pretend to maintain an office there. Bill wrote: "I have been in Washington since the fall of 1934, practically since the fall of the Republican party, and I wouldn't be surprised if Washington remained home for some years." Bill is one who firmly and frankly believes "no class reunion can ever have the real spirit of what I call a reunion so long as wives and families are included." He attended our 1926 reunion at Saybrook, Conn., but "only overnight or until the next train back to New York, after realizing what kind of a show it was to be." There you have the other side of the picture.

Ralph Hanson, XIII-A, a captain in the United States Navy, who for years has been in Pittsburgh, sent in his dues from Philadelphia, where he now is supervisor of shipbuilding for the United States Navy in the Cramp Shipbuilding Company. Hubert Judd, I, Vice-President and Secretary, Community Oil Company, Dalton, Ga., sends an extra dollar with his dues bill saying: "One dollar is too modest a sum. You can't even get turnip greens and hog chitterlings down here for that!" Neither Captain Hanson nor Judd will be able to attend in June.

On the other hand, Roy MacPherson, II, is now at sea on the flagship *Duane* of the Coast Guard Service, in connection with work he has been doing in the Coast Guard Reserve, but his wife, Ina, writes from Framingham, enclosing a dues check, that they are making plans to be with us at Plymouth, as is Ralph Runels, I, head of R. E. Runels Construction Company, Lowell, who writes: "Had such a fine time on the twenty-fifth that I'm planning to attend again this year and will try to bring Sam Scribner, I, with me and to persuade Norm Lougee, VI, to come from New York."

Alanson Palmer, V, head of the A. L. Palmer, manufacturers' agents, Rowlands Building, Columbus, Ohio, wrote from Tampa, Fla., in mid-February: "Regret I cannot make the riffle to get back in June. I will have to keep my nose to the grindstone after this winter of comfort away from cool Ohio. My business is best from May 1 to October 1, so toast the absent class member and bend the elbow in historic fashion. Thus I will be thinking of you gray-headed and bald old-timers. I haven't been 'selected' yet, but have my application in for an old-age pension which will be due in another fifteen years."

Harry Tisdale, V, asked that definite reservations be made for him and his wife, adding that the latter is now taking diathermic treatments twice a week for her still-stiff knee, following last fall's auto accident, and she seems to be improving nicely. Joe and Rose Harrington were their guests at Scarsdale, N.Y., in late January, Joe being east on a business trip for the Standard Alcohol Company, with which he is located in Chicago. They, too, hope to get back east for the reunion. Harry went to Montreal in mid-February to talk on "Natural Dyestuffs" before the Quebec section of the Canadian Association of Chemistry Calorials.

Louis Wetmore, architect in Glens Falls, N.Y., said that sending his check for class dues was a pleasure "considering that you have done so well in keeping the channels open to Tech." Frank Wood, II, fears he won't be able to get to the reunion, even though he is close by — with the Salem Gas Light Company, in Salem, the Witch City. He reports his daughter was married a year ago and lives in Wakefield, while his son is at Northeastern University, which is presided over by our Carl Ell, XI. Young Wood made the dean's list the first semester this year. He is six feet two. — Pete White, II, writes: "I've been liv-

1911 Continued

ing in Beaver Falls, Pa., for almost two years and on January 1 was appointed general manager of the Babcock and Wilcox Tube Company, so the chances are that the Pittsburgh region will be my permanent residence for quite awhile. Last week I went to the Pittsburgh Traffic Club dinner, and I ran into Marcus Grossmann, III. We had quite a chat discussing the reunion. At the moment I am very hopeful that I will be there. Nothing except an acute business situation will prevent my attending." In response to a request, I sent him a list of '11 men in the Pittsburgh region, so that he could "arrange for dinner some night at the Duquesne Club in Pittsburgh to discuss our forthcoming reunion, which should in many ways be our best and most successful."

Zeke Williams, XI, vice-president, general manager, and partner of Erwin, Wasey and Company, advertising, Graybar Building, New York City, also says he is definitely planning to attend the reunion with Mrs. Williams. He adds: "Business keeps me very busy, but I have always liked hard work. Our London office is doing an amazing business in spite of the war over there. How they carry on this way is beyond me and each month I get a real surprise when I get their monthly statements. I flew over and back on the clipper a year ago last fall, after the war had broken out, and I hope to go over again before too long. My son, David, is in his third year at Harvard. I never thought I would have a boy in Harvard, but I have become accustomed to it now. He is making a fine record over there; he must take after his mother and not the old man. My daughter, Ann, is a freshman at Smith College. I have three British refugees in my home."

Alec Yereance, I, Prudential Insurance Company of America executive in Boston, says: "Now the prospect, even though remote, of a couple of days on a beach in the sunshine seems pretty fine — to say nothing of the congenial company! Best wishes for the biggest and best gathering of all." Closing this alphabetical roundup, hearken unto Rufe Zimmerman, IX, Vice-President of United States Steel Corporation, who writes: "I was fortunate in seeing Don Bakewell, II, and Pete White, II, while in Pittsburgh in mid-January, and both of them are interested in attending the thirty-year reunion, subject, of course, to all of the things which may happen to prevent the carrying out of good intentions these critical times. I will do all I can to stimulate attendance from both the Pittsburgh and New York classmates."

From the Alumni Office come three new addresses: Morell Mackenzie, II, Melrose Hotel, Dallas, Texas; Chester T. Morey, II, 1 Drowne Parkway, East Providence, R.I.; and J. A. Proctor, Claude Neon Lights, Inc., 41 East 42d Street, New York City. Each has been requested to send in a personal activity report for a subsequent set of class notes.

Here's a gay note to close with: class participation in the successful dinner dance which the Technology Club of New York tendered President and Mrs. Compton at the Biltmore Hotel on the evening of February 5. Our table there made up in accomplishment, it seems, what it lacked in numbers. Four classmates and their wives attended — Liv Ferris, VI, Dick Gould, XI, Bob Morse, VI, and Nat Seeley, II, — with Nat's son, Frank, a junior at the Institute, and his young lady bringing the table total to ten. "It was really a very swell party," writes Dick Gould, "and Ferris distinguished himself and brought great honor to the Class. One of the features of the evening was a dance competition conducted by two young people from Arthur Murray's. In the competition for the Viennese waltz, Ferris waltzed away with the honors and brought back to the table a bottle of champagne as a result. I might add that my own good wife was likewise successful in the polka, and with the two bottles which she secured and the one that Ferris won, it proved to be a joyous (hic) occasion! Of course our interests were not entirely confined to '11, and there were hosts of other friends in neighboring classes whose presence helped to make the evening a success. The reunion of this coming spring seemed to be in the minds of all the '11 people there, and I think you may count on a solid representation from New York. I will see you then, if not before."

That's a fine note to close on, mates — here's hoping I "see you then, if not before!" — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1914

Affel, Barratt, and Hadley with their wives represented '14 at the Technology Club of New York dinner, which was held in the Biltmore Hotel on February 5. Charlie Fiske and your Secretary attended the preprandial festivities, but because of engagements made before the dinner date was set were unable to remain longer. Ross Dickson had also planned to attend, but was unable to do so because of the serious illness of Mrs. Dickson. Our own class dinner on March 5 will be reported in the next issue of The Review.

Class members may well be proud of this year's senior class at the Institute, since it contains eight sons of '14 men. This must come near to a record for a Class graduated but twenty-seven years this June, particularly with the war years that intervened. The sons of '14 men in the senior class are Herman A. Affel, Jr., Chester A. Corney, Jr., Arthur L. Covitt, Frank J. Jerome, 3d, Walter P. Keith, Jr., Howard A. Morrison, Jr., Clifford L. Muzzey, Jr., and Lyle M. Richardson, Jr. Note that all but one bear the same names as their fathers. Peter Horton was also in the Class of '41, but became defense-minded and left. Two sons of '14 men have already been graduated. They are Leigh S. Hall, Jr., '39, and Richmond W. Wilson '40. Thus this year's Class will bring the father and son graduate group up to ten.

Another interesting group is that of '14 men who have sent two sons to the Institute. They are Leigh S. Hall and Louis A. Wilson, who each have one son graduated and another still at the Institute; Walter C. Eberhard and Clifford L. Muzzey have two sons there now. In addition, Walter Eberhard is himself on the staff at the Institute.

The total score for sons of '14 men, according to your Secretary's records, is as follows: graduates, 2; former students, 1; seniors, 8; juniors, 3; sophomores, 6; and freshmen, 3; — total 23. Those '14 men having sons at the Institute not mentioned above are Crocker, Hoyt, Spitz, Wheeler (deceased), Ruoff (deceased), Stearns, and Tallman.

Put Alumni Day, June 9, on your calendar. We will have our usual predinner class meeting. — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York, N.Y.

1915

It is sad to report the death of Guernsey A. Palmer on February 7 in Houston, Texas. We have none of the details of this, but on behalf of the Class I wrote immediately to Mrs. Palmer, conveying our sympathies and condolences. We were fortunate to have Guernsey with us at our twenty-fifth reunion in June, and his presence recalled his loyalty and interest in class affairs and his generous and willing support of our activities. To Mrs. Palmer and her family go our deepest feelings.

New address for Gabe and Tess Hilton is R.F.D. No. 1, East Aurora, N.Y., and may indicate that Gabe is entrenching himself in the country for the war aftermath, but Doug Baker's fascinating new address at Standard Villamessagi, Fehervari-ut 70, Budapest, Hungary, leads us to wonder where he is and what he is doing. I have written to Mrs. Baker and hope we can hear from Doug, for certainly he must be having an exciting experience in that war-torn country.

From Harold B. Harvey '05, I received a booklet published by the Technology Club of Chicago. This is indeed an impressive volume with names, addresses, statistics, and detailed information of all Technology men in the Chicago area, including, of course, a number of our own '15 men out there.

Sam Berkowitz wrote from Beverly Hills, Calif., where he was spending the New Year's holidays after a few weeks' fishing in Florida in December, that he is returning to locate his headquarters in Boston. Sam says that his return will give him an opportunity to revive some of the old friendships. Recalling Sam's activities during the planning of our twenty-fifth reunion, we shall all be glad to see him here again. — Joe Livermore was recently at the Institute to see his son, who is a second-year student, I believe, and dropped in to see Barbara Thomas, leaving her the news that he has a new position — plant manager for the United States Rubber Company

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1915 Continued

at Passaic, N.J. He sent his regards to all of his friends in the Class. Our best wishes to Joe for success on his new job.

Ken Kahn sent me the February 7 copy of the University of Southern California's paper, the *Southern California Trojan*. It carries a front-page story about Ray Stringfield, X: "Because of the number of engineering 'defense courses' established and being established at Southern California, a central desk under the direction of Mr. Raymond B. Stringfield has been assigned the handling of the organization and promotion of the new courses. Mr. Stringfield was for many years a consulting chemical engineer in this area and a university coordinator for the engineering defense training program. He will be in charge of the organizing of new classes, contacting industrial heads and instructors, and securing government approval of the proposed courses." Good luck to Ray in his contribution toward our national defense.

As these notes are written, we are planning a movie party for wives and families of classmates in the Boston area. We plan to show Herb Swift's collection of movies over the past five years, including our reunions at Saybrook and Oyster Harbors. The pictures have been strictly censored. Refreshments will be served for both the children and the grown-ups, and we are looking forward to a jolly evening. Following this meeting I shall arrange to show all these movies in New York and Philadelphia. — So ends our column written by "Helpless Azel." — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

1916

In conversation with Francis Stern of Hartford recently, I learned that he is planning definitely to come to the reunion. He hopes that instead of the free and limitless quantities of liquor and the emphasis on vigorous physical exertion in sports such as baseball, tennis, and swimming that characterized our twentieth reunion, our twenty-fifth will have plenty of easy chairs, lots of cushions, and plenty of big umbrellas.

The following item concerning Tom Holden appeared in the New York *Times* of January 24: "Directors of the F. W. Dodge Corporation elected . . . Thomas S. Holden president of the corporation to succeed the late Truman S. Morgan. Mr. Holden joined the organization in 1919 as chief statistician. He was made vice president in charge of statistics and research in 1927 and elected a director in 1928." Tom plans to be with us at the Oyster Harbors Club.

Preliminary information concerning our big party at the Oyster Harbors Club on June 6, 7, and 8 has been sent to 498 members of the Class. At this writing 112 cards have been returned; 52 classmates have answered definitely that they will attend the reunion. Of these, 33 were at our twentieth reunion, so 19 new faces will be on deck this year. When these notes are read there will be only two more issues of The Review before the reunion, so do your part and talk up the week end at Osterville, Mass., and remember that expenses will not exceed twenty-five dollars unless your thirst gets the better of you. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1917

Reports have filtered in from all sections of the country that Tom, Dick, and Harry were surprised and delighted to receive a box of "delicious," "beautiful," "handsome," "wonderful," apples from Neal Tourtellotte for Christmas. The Yuletide spirit, they thought, must have suddenly hit dear old Neal with a bang. Your Secretary, Assistant Secretary, and correspondent for this month's notes, Ted Bernard, would have thought the same if they had received some apples, but, sad to relate, they did not, and being a little miffed at this oversight they decided to investigate. Here is the story. It seems that the export market for Washington apples was rather upset by the war, and the farmers found themselves with a surplus crop. Big business firms, which, of course, included Tourtellotte-Bradley, Inc., were invited, urged, cajoled, and exhorted — all of which adds up to polite business blackmail — to buy a carload or two of apples. One man can eat just so many apples, regardless of the plight of the apple farmers, and the balance could not be given away in Seattle, for everyone there was fully fed up with them. *Voilà tout.*

Ray Blanchard was recently elected a director of the First National Bank of Malden, Mass. He has also been named chairman of the dinner committee for Alumni Day, which fact should assure us of a choice table location and a good meal.

As a result of a nation-wide investigation by a committee of the American Public Health Association of which Clair Turner was chairman, a small book, *Community Organization for Health Education*, is being published by the Technology Press. — An article entitled "Thermoplastics," by John DeBell, appeared in a recent issue of *Modern Plastics*.

Dick Loengard, Joe Littlefield, and Wesson Hawes attended a Course XV dinner at the Technology Club of New York and unexpectedly found themselves the honored guests of the evening. The honor consisted of standing up to give the assembled guests a view of what a member of the charter class of Course XV looks like. It was conceded by a rising vote and tumultuous applause that they were still pretty good looking.

Mack Angus, recently promoted to the rank of captain in the Navy in the Civil Engineer Corps, is in charge of all shore construction work at the Charleston, S.C., Navy Yard and the sixth naval district, which includes the Carolinas and Georgia.

Loosh Hill is a representative on the Alumni Council for the Technology Club of the Merrimack Valley. It was announced at the January meeting of the Council that Penn Brooks was one of the three nominees for term membership of the Corporation. This is generally recognized as the highest honor which the Alumni Association can tender an Alumnus. Penn is the first one of our Class to be thus honored. Our sincere congratulations to him. We are sure that he will, during his five-year term, make a real contribution to the Institute. As a matter of fact we have concrete evidence of his devotion to the Institute. It was decided that the Dean's office should be made more attractive and homelike for those boys who have to spend so much of their time there and that some nice bright wallpaper would be desirable. Penn hung a "quiet please" sign on his office door, went into a huddle with his wallpaper department, and by the next air mail there arrived at the Institute several sample rolls of wallpaper appropriate for a boy's room. There were nursery scenes, wild-west characters, Mickey Mouse and companions, and so on. Several of these samples were hung on the walls to get the effect. Sad to relate, Lobdell bethought himself of that old wheeze, "Technology is a place for men to work, not for boys to play," and the walls were papered in soft brown befitting the mature minds of the Institute's "men."

At this writing Lobby was being entertained by Ras Senter, tycoon of Dallas, Texas, and adjacent territory. Ras wrote: "I have just learned that the Honorable Harold E. Lobdell, eminent Dean of Students, is to be in Austin about the middle of February, and I have exacted a promise of him to let me show him a little of Texas and Louisiana. We are planning a trip through San Antonio, Houston, and on to New Orleans, La. I don't know just what his reaction will be, but once I get him in my car, he will be unable to make any protest or objection." It seems to us that Lobby must have been taken for a nice long ride.

We hope you have read the report covering the operation of the Alumni Fund for its first year. Win McNeill, Class Agent for the Alumni Fund, wishes through this column to thank again all of those who contributed. He expresses the hope that we as a Class will continue to assume our share of this responsibility. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

I cannot give you an eyewitness description of the New York dinner for Dr. and Mrs. Compton, as a touch of the grippe had me down, but I asked Tom Brosnahan to give me the information, as I felt sure he and Mrs. Brosnahan would be there. I fear the Class isn't given to such affairs. Beside the Brosnahans, the Krasses, the Neubergs, and Bill Wyer were at the dinner. From the description given me I gather that it was a very gay affair. The after-dinner speeches were cut to the bone, and a quite different program was given to those present.

1918 Continued

Tom tells me that Bill Wyer has severed his connection as a railroad magnate and now has a business of his own in Newark as a consulting engineer, specializing in railroad problems. — Can anyone tell me what has become of Parry Kennard? The Alumni Office is trying to locate him. Mail sent to his old address of 150 East 54th Street, New York City, is being returned. Anyone who knows of his whereabouts please communicate with me so that the information may be passed on to the proper source.

I'm very sorry to say that I have another death to announce in these notes. Stanley Robinson Cummings of Evansville, Ind., died on February 4. The following was sent me: "Mr. Cummings was a top-notch fellow and a real engineer. He left Technology, and went with the Hoover Company in Canton, Ohio, working on research and development. In 1939 he left them to go with the Sunbeam Electric Manufacturing Company in Evansville, in charge of their research." — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

The Technology Club of Chicago has recently released the 1940 edition of their directory. Richard Francis Cashin, Jr., President of the Westboyd Chemical Company, is a member of their executive committee. Other members of our Class listed in this directory are: F. W. Barney, R. L. Burchell, A. G. Hoffman, Frank C. Hoyt, F. L. Hunter, John O. Merrill, David P. Minard, Henry A. Miner, E. F. K. Seifert, B. H. Sherman, and Horace D. White.

Recently Alan G. Richards of the Dewey and Almy Chemical Company, Cambridge, Mass., was in New York, and he stopped in to see me. I was out of the office at the time so did not see him. However, I gather that he is extremely busy, and I look forward to seeing him on his next visit to New York. — Wirt F. Kimball wrote from Cambridge, Mass., that his new address is 96 Payson Road, Belmont, Mass. He is still with the Cambridge Gas Light Company as an industrial gas engineer. Wirt is married and has one son. He seldom, if ever, bumps into any of the others of the Class. Wirt wondered how the plans for the twenty-fifth reunion are coming along.

George C. McCarten wrote from Bound Brook, N.J., that the M.I.T. Club of Northern New Jersey was to have a beer party at Feigenspan's brewery in Newark on February 20. He and Don Way planned to attend, and he wondered if I could make it. Unfortunately your Secretary was in the throes of having an addition to the family and was not able to attend this party. — John O. Merrill wrote from Chicago. He is a partner of Skidmore, Owings and Merrill, architects, 104 South Michigan Avenue, Chicago, and 5 East 57th Street, New York City. — Edward G. Moody wrote from Cambridge. He is an oil equipment engineer at 59 River Street, Cambridge, Mass.

Marion T. Lyndon wrote from Knoxville, Tenn. She is head of the department of retailing in the School of Business Administration, University of Tennessee. This is her fourth year there, and she likes her work and living in Tennessee. She has had twelve years of store experience as merchandise manager, personnel director, and stylist, and also three years as a newspaper fashion editor and in advertising. She states that the University of Tennessee is co-educational. We all wish Marion the best of success and hope that she will look us up when she gets into New York and will be on hand at our twenty-fifth reunion.

Marshall C. Balfour has moved from Shanghai, China, to the Rockefeller Foundation, Marsman Building, Port Area, Manila, P.I. John J. Falkenberg is at 511 Forest Street, Denver, Colo. Ethel Fernald moved from Melrose, Mass., to 716 231st Street, care of Mrs. John Dole, New York City. Oliver F. Freeman has moved from Barrington, R.I., to 45 Sylvan Road, Rumford, R.I. Ralph J. Hannigan is at 37 Cross Street, Brockton, Mass. E. Russell Hubbard has moved from Newton, Mass., to Apartment 57, 119 West 45th Street, New York City; Robert Insley from Hartford, Conn., to the Menasco Manufacturing Company, 805 East San Fernando Road, Burbank, Calif., and I. Paul Maizlish from Los Angeles to 745 North Detroit Street, Hollywood, Calif.

Your Secretary and T. Shea held forth for the Class at the Technology Club of New York banquet held at the Biltmore Hotel on February 5 in honor of Dr. Compton. Tim Shea has a son entering M.I.T. next year and another son who will enter two years from now. Shea is president of the Electrical Research Products, Inc. On February 19 Carl Rogers, Tim Shea, Freddy Given, Leo Kelley, Ralph Gilbert, Don Way, and Gene Smoley had dinner at Carl Rogers' home, 286 West 11th Street, New York City. Carl Rogers and Freddy Given are with the Bell Telephone Laboratories. Leo Kelley is an expert on patent litigation cases, having worked with radio to a great extent. Don Way is with the Singer Sewing Machine Company, and Ralph Gilbert is with the American Telephone and Telegraph Company. The wives were also present, and a most interesting evening was spent by all.

Edith Clarke was presented the annual prize for the best paper read before the northeastern district of the American Institute of Electrical Engineers and was cited for her public service at the Woman's Centennial Congress in New York in November. Congratulations from the Class.

William H. Bassett, Jr., published an article on "Dustless and Sliverless Wire" in *Iron Age* of September 5. Bill is chief metallurgist for the Anaconda Wire and Cable Company.

R. B. MacMullin rendered songs at the Niagara Falls Technology Club meeting on November 27. Malcolm R. McKinley is secretary of the Technology Club of Central Florida and is with the Tampa Electric Company, Tampa, Fla. L. J. Grayson attended the last dinner of the Washington Society of the M.I.T.

Your Secretary is pleased to announce the arrival of Louise Margery Smoley, born on February 20 in New York City. — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. MCCREERY, *Assistant Secretary*, 131 Clarendon Street, Boston, Mass.

1920

Bill Dewey has left Auburn, N.Y., and is now in Wallingford, Conn. Eric Etherington is with the C. J. Grip and Company, 49 Federal Street, Boston. Jim Harrop is in Baytown, Texas, while Lauren B. Hitchcock is now with the Hooker Electrochemical Company, Niagara Falls, N.Y. Mal Lees has moved to Ridgewood, N.J., 405 East Glen Avenue, and we understand the old financial wizard is doing right well. Harold Bower is in Swarthmore, Pa. B. J. Clark's home address is Hartsdale, N.Y., 8 Maplewood Road. Bill Forbes is at Fairhaven, Mass., at 162 Main Street. Samuel Rubin, when last heard from, was at Fort Amador, Canal Zone. Charles Klingler is in Milwaukee, Wis., address 4732 North Cumberland Boulevard. Charles Hart is in Syracuse, N.Y., at 424 Durston Avenue. John Nalle is now in Waterbury, Conn., address 130 Euclid Avenue, and Jim Blodgett is in Columbus, Ohio, at 699 South Roys Avenue.

I ran into Herb Ham '22 in the Waldorf-Astoria lobby. He looked plump and prosperous. Shortly afterward, I met O. S. True, also '22 and looking mighty prosperous. He is sales manager of the United States Rubber Company in New York. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

Have you answered Ray's broadcast letter on the plans for our Tremendous Twentieth? Dig it out right away and mail the answer now. Only two months remain before we start our reunion celebration on the evening of June 6 at the Griswold Hotel on Eastern Point, New London, Conn. For two days, old acquaintances will be renewed and the battle of the Charles fought all over again. On Monday, June 9, many of the group will go to Cambridge to join the roster of reunion classes which are especially welcomed on Alumni Day. Come to the reunion. See your old friends and give the rest of the gang a chance to meet you again. You now have the class directory. Look up the fellows in your town or your state and make up a party for a real vacation in June. Write to five others of your Course and tell them to meet you in New London. Help your committee make this party even better than our past anniversaries by swinging into action at once. Write Ray right away!

The Institute Gazette scooped the Class Secretaries again in the February issue of The Review, and it is not without a muttered imprecation in this direction

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1921 Continued

that we re-record the welcome news that the sons of two of the Class registered as freshmen this year at the Institute. Thomas S. Barrows '44 is the son of Ralph G. Barrows, I, a lieutenant colonel in the Corps of Engineers, United States Army. William B. Scott '44 is the son of Stanley L. Scott, I, a lieutenant colonel in the Corps of Engineers, United States Army, who is United States district engineer located in the Gay Building, Little Rock, Ark.

Current book sections of the Sunday newspapers carry advertisements of *Horizons Unlimited*, by S. Paul Johnston, II, a graphic history of aviation from the time of Leonardo to the stratoliner of today. The book of some sixty thousand words of text and three hundred photographs is published by Duell, Sloan and Pierce, Inc., New York, at $3.75. Other current advertising lists *Escape to Glory*, a movie whose scenario was written by David O. Woodbury, VI-A.

Quadrupling from Carl G. Richmond '11 to Orville B. Denison '11 to Ray to us, comes a message from Richmond from the Benedick Hotel, Washington, D.C., which says: "Across the corridor from my hotel room is LeRoy M. Hersum, I, a major in the field artillery, United States Army. He is on the general staff. Of course I knew him in Boston, where he has been a consulting engineer for a number of years. He is a capable and highly placed officer of the Army." Best wishes, Roy, and thanks to Carl and Dennie.

Willard A. Emery, II, has been transferred from the Harrison, N.J., plant of the Worthington Pump and Machinery Corporation to become welding superintendent of Worthington's plant at Holyoke, Mass. Bill has been active as an Honorary Secretary of the Institute and in alumni affairs in the New Jersey area, and we hope some of the Holyoke brethren sign him up for immediate duty. We recently scoured Glen Rock, N.J., in search of Mr. and Mrs. Malcolm B. Lees, '20 and '21, respectively, only to find they had hopped across the line to neighboring Ridgewood, where we failed to find anyone at home at 405 East Glen Avenue. We'll get a story from these nomads if they ever settle down!

William H. F. Rose, Jr., XV, general manager of the Christian Feigenspan Brewing Company, Newark, N.J., famous the world over for "P.O.N.," was the host to the Technology Club of Northern New Jersey at an M.I.T. stein party at the brewery on February 20. Our Class distinguished itself by having present (a) the noisiest, in the person of Bill Rose himself; (b) the busiest, Max Burckett, Vice-President and general factotum of the Club; (c) the one who came the farthest, Munnie Hawes of Manasquan; (d) the individual of largest capacity, Man Mountain Dayton Brown. Others of the Class who distinguished themselves only for disposing of huge quantities of beefsteak and beer were Sumner Hayward, Fred Kowarsky, Louis Mandel, and Cac Clarke.

Howard L. Vickery, XIII-A, a captain in the United States Navy and a member of the United States Maritime Commission, was the guest speaker at the annual dinner of the alumni association of the New York State Merchant Marine Academy, held in New York City on February 15. Vickery makes his headquarters at Room 4836, Department of Commerce Building, Washington, D.C.

Dugald C. Jackson, Jr., VI-A, dean of the College of Engineering, University of Notre Dame, Notre Dame, Ind., writes his usual complete and most welcome letter, from which the following are excerpts: "The enclosed two clippings will indicate what I have been doing for the past month and a half with about half of my time. Finally four courses have been approved and started. In physical metallurgy there are 70 students; in chemical analysis of metallurgical materials, 24; in tool and die design, 65; and in production engineering, 80. These courses will run twenty weeks. Note particularly that the courses were proposed by industry as a result of inquiry from the university.

"There are several Technology men on the Notre Dame engineering faculty, all first-rate engineers and good teachers: James A. McCarthy '28, instructor in civil engineering; P. A. Guarino '35, instructor in electrical engineering; L. F. Stauder '31, assistant professor of electrical engineering; and Edward A. Coomes '38, assistant professor of physics. Guarino obtained his master's degree from Notre Dame last June, which may be news of interest to his Class. I think that this is one of the largest representations from any institution on the Notre Dame faculty outside of our own graduates." The clippings to which Dugie refers are both from the South Bend *Tribune* and describe the opportunities offered to workers in industrial plants in South Bend and five neighboring cities to attend evening engineering classes at Notre Dame, free of all expenses except books, instruments, and transportation. The courses are sponsored by the United States Office of Education program for national defense. Various companies and civic organizations co-operated with Dugie and his staff in completing all arrangements for the courses. We offer Dugie and his colleagues good wishes in carrying out the program and hope it will not prevent him from being with the Class at New London in June.

The following changes of address were received since the printing of the class directory which has been sent to all members of the Class. Make these changes in your directory to keep it up to date: Harrol W. Baker, V, 17826 Clifton Boulevard, Lakewood, Ohio; Orrin Champlain, Jr., III, Old Lyme, Conn.; Robert M. Felsenthal, X, Sears International, Inc., 4640 Roosevelt Boulevard, Philadelphia, Pa.; Herman F. Finch, II, Post Office Box 163, Balboa Heights, Canal Zone; Watts S. Humphrey, III, Litchfield, Conn.; Edward I. Mandell, I, Mandell and Company, 1626 Pennsylvania Avenue, Miami Beach, Fla.; Roy C. Mitchell, X, 1600 South Center Street, Terre Haute, Ind.; Myer H. Naigles, XV, 3649 Veazey Street, Northwest, Washington, D.C.; Ernest M. Norberg, I, 288 Steel Street, New Britain, Conn.; Albert H. Tomlinson, X-A, 715 East 25th Street, Paterson, N.J.; Howard L. Vickery, XIII-A, Room 4836, Department of Commerce Building, Washington, D.C.

Come to the reunion. Contact all your friends and neighbors now and don't forget to write Ray right away! — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, International Telephone Development Company, Inc., 137 Varick Street, New York, N.Y.

1923

President Bob Shaw got himself a half page of publicity in the New York *World-Telegram* in January, a nice boost for the New York Museum of Science and Industry, of which he is director. "Tall, round-shouldered, with furrows in his brow and ingenuity in his brain," the special reporter who wrote the story describes Bob. There's a really good picture, however, with the feature. The bulk of the article deals with the ingenious and very popular shows which the museum, located on the first floor of R.C.A. Building, puts on for the edification of half a million people a year.

A small but select group of the Boston Alumni of '23 got together for dinner at Walker Memorial on January 28. The attendance was disappointing, but those present had a good time. After dinner there was bowling with the following three-string scores: Pete Pennypacker, 318; Doris Pennypacker, 271; Dorothy Bond, 262; Horatio Bond, 249; Don Height, 231; Howard Russell, 214; and Mildred Russell, 192. — I guess that '23 men are not social lights, because Jack Keck and Lem Tremaine both report that the '23 representation at the Technology Club of New York on February 5 for the dinner dance honoring President and Mrs. Compton was similarly slight. Only Bob Shaw, Lem Tremaine, Dave Kaufman, and their respective wives were present.

Ski casualties in January, Jack further reports, included a broken leg for Miles Pennybacker. For the stein party of the M.I.T. Club of Northern New Jersey on February 20, Charlie Roche was to furnish a five-piece band, and Miles, broken leg or no broken leg, was to lead the annual carousal.

Edward R. Schwarz was elected vice-president in charge of industrial safety of the Massachusetts Safety Council in January. — Some recent address changes for men in the service show changes in rank from that of major to lieutenant colonel for Arthur B. Custis, at the headquarters of the Hawaiian Air Force, Fort Shafter, T.H., and Roland P. Shugg at the Field Artillery School, Fort Sill, Okla. Harrison Shaler, Ordnance Office, War Department, Washington, D.C., has a promotion from captain to major. — Thanks to the thoughtfulness of Pete

1923 Continued

Harvey '05, President of the Technology Club of Chicago, I have a copy of the new directory of Chicago Alumni, which helps to bring the records up to date on thirty-one members of the Class in that area. For those for whom the directory gives something more than a simple address, here are the '23 men listed: Elliott A. Adams, chief engineer, Massey-Harris Company, Ltd., Racine, Wis.; Edward M. Bolding, assistant to the president, Weiboldts Department Stores; Franklin G. Clement, Clement, Curtis and Company, stock brokers; Verne V. Cocks, Commonwealth Edison Company; John V. Cook, chief engineer, Peterson Oven Company, manufacturers of bakers' ovens; Winthrop K. Coolidge, secretary and treasurer, Chicago Copper and Chemical Company; Charles W. Cristal, district manager, Crocker Wheeler Electric Manufacturing Company; Henry F. Culver, mechanical engineer, Western Electric Company, Inc., Hawthorne Plant, Cicero; Roland W. Frieder, vice-president, First United Finance Corporation; Miles Glover, radio department, Commonwealth Edison Company; Charles C. Henry, Chicago Die Mold Manufacturing Company; Whitney C. Huntington, head of the department of civil engineering, University of Illinois, Urbana; Irving J. Kahan, western sales manager, Sprague Products Company, radio parts; Joseph P. Keegan, assistant manager, bakery department, Standard Brands, Inc.; Henry N. Landis, Landis and Landis, commercial chemists and metallurgists; Pete V. Martin, assistant division superintendent, Coke Plant and Blast Furnace, Carnegie-Illinois Steel Corporation, Gary, Ind.; Herbert C. Mitchell, United States Army, retired; Louis M. Nelson, president and general manager, North Shore Hotel Company, Evanston; Milton E. Parker, manager of production, Beatrice Creamery Company; Edwin R. Richards, Carnegie-Illinois Steel Corporation; Ralph E. Rubins, Harza Engineering Company, hydraulic engineering; Aubrey W. Seels, construction engineer, Chicago Bridge and Iron Works; Kilburn M. Smith, supervising planning engineer, Commonwealth Edison Company; Francis P. Squibb, western sales manager, pigments, color and chemical division, Sherwin Williams Company; Albert H. Steinbrecher, vice-president and assistant general manager, Compressed Industrial Gases, Inc.; Orr Nash Stewart, store manager, F. W. Woolworth Company; Ernest W. Thiele, Standard Oil of Indiana, Whiting, Ind.; Dr. Harold C. Wagner, medical faculty, University of Chicago; Michael F. Yarotsky, assistant division superintendent steel production, Carnegie-Illinois Steel Corporation. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass. JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

1926

The committee for the fifteenth reunion held a class dinner in Boston on February 18 to report on reunion plans. Those present included Baylor, Lyman Billings, Broughton, Bush, Dolben, Hemeon, Howard, Killian, Levis, McNeil, Meehan, Pearlstein, Peterson, Remington, Rich, Salmon, Shaheen, A. W. Smith, G. W. Smith, Spence, Taylor, Toperzer, Valentine, and Wilbur. With George Smith as master of ceremonies the dinner was eminently successful, and this result was contributed to by Bud Wilbur, who spoke on the Smith-Putnam wind turbine project for which he is chief engineer. A group of companies are building on the top of Grandpa's Knob in Vermont a large wind turbine for the production of secondary electrical power. Figures on size and capacity have not been released, but an idea of the magnitude of the "windmill" is given by the statement that the propeller has a diameter comparable to the span of a large bombing plane.

Other speakers at the dinner were the chairmen of the various reunion committees, including Pink Salmon, who spoke on plans for publicizing the reunion, Flint Taylor, who outlined some of the objectives of the sports and entertainment program, and Cedric Valentine, who described the charms and advantages of the hotel to which we are going.

One of the men who wrote in regretting that he could not come to this dinner was Bob T. Dawes. He reported that this year he is chairman of the town finance committee in Hudson, Mass., and that the committee has meetings every night during February. — Recent visitors to the Institute include John McMaster, who is chairman of the industrial and heating committee of the New England Power Engineers Association, and whose headquarters are in Wareham, Mass. — The second visitor was Bob Chidsey, who is assistant engineer of boundary surveys for the Connecticut Highway Department. His headquarters are in New Milford. — Laurence G. Cumming writes that on December 13 he reported for duty as a senior lieutenant in the Naval Communications Reserve. He is now attached to the district communications office of the first naval district and is busy with the maintenance of naval radio stations in New England. He reports that Morton Woodason is scheduled for some navy training. Bob Dean, now a major, is stationed at Camp Edwards, as is Ken Billings. — The Secretary would appreciate news about members of the Class who are going into the armed services. He would like very much to keep a roster of those who are participating.

Running through the address changes last issued by the Alumni Office, the Secretary was impressed again by the poetic quality of some of our classmates' addresses. He noted, for example, that Ralph Adams is dwelling on Diablo Heights, Canal Zone. He noted next that Alex Brown, by way of antithesis, lives at Church Corners Inn, East Hartford, Conn. With an augury of Eastertide, stil another slip reports that Cornelius M. Flynn lives in what must be horticultural splendor, his address being 312 Tulip Avenue, Floral Park, Long Island. — Remember that our fifteenth reunion is scheduled for June 7 and 8. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3–208, M.I.T., Cambridge, Mass.

1927

The Sullivan Machine Company boys, Tom Russell and George Bergman from Chicago and St. Louis, respectively, have, by co-incidence or otherwise, sent in their contributions of news and gossip in practically the same mail. Tom, who is district sales manager for the Midwest, has lived in St. Louis, Denver, Montreal, Philadelphia, Washington, Baltimore, and Chicago on his way up the Sullivan ladder. We quote Tom: "W. A. Witham dropped in at my office while I was out of town. As I have not seen him since graduation, I was indeed sorry to have missed him. His card says: 'the Gleason Works, builders of bevel gear machinery, 1000 University Avenue, Rochester, N.Y.' I met Andrews while he was in Chicago supervising construction of a new plant for Eastman Kodak."

George Bergman came through with a letter telling that his travels take him all through Missouri and Kansas, that he is not married, "and without bragging a bit, we (George and Tom Russell) are the best coon hunters in the Ozarks." He says that Frank Mesker has Mesker iron sash all over Missouri and that he's doing "O.K." From another source known to be extremely reliable we hear that George "has dropped forty pounds from his former generous avoirdupois, making him more of a threat than ever along the St. Louis great white way."

Parke Hodges is back in the United States, perhaps for keeps this time, after mining and investigating mineral deposits all over South America. He is living in Noroton, Conn., and working at Climax Molybdenum Company, 500 Fifth Avenue, New York City.

The next jump is to Belmont, home of Werner Willmann. Wernie is with Whiting Milk Company in Boston and is involved with their general sales work and policy. Married in 1929, the Willmanns have three youngsters, two boys and a girl. — Henry Fowler is located at New Britain, Conn., having arrived there via New York, Pennsylvania, and Kentucky. He is production superintendent for the North and Judd Manufacturing Company. Apparently approaching baldness, he blames the New Deal (Secretary's note: a likely cause) and not three lively kids. Hank reports that Denny Dearle is in charge of the plastics division of North and Judd and also lives in New Britain.

M. L. Perry, Jr., reports from Kansas City, Mo., that he is doing designing, estimating, specifications, tests, and most everything else as an electrical engineer for Black and Veatch, consulting engineers. The Perrys have been married nine years and have a daughter four years old. — Bill Erwin is at Waltham, where he is doing experimental development in the Waltham Watch Company research division. Bill was in the process of getting married when heard from, and I find that Bill was issued patent No. 1,943,009 on

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1927 Continued

a reciprocating motor, as well as others on a Windikator, a pocket anemometer, and so on. Bill promises to reply promptly to any letters from his old friends who may find the time to write him. His home is at 344 Crescent Street, Waltham, Mass.

Howard Ferguson is a member of the home office manufacturing staff of Standard Oil Company of Ohio. The latest statistics on the Ferguson family show two children: a boy nearly a year old and a daughter approaching five years. Hank Steinbrenner was reported by Fergy as being around Cleveland and is a regular attendant at the alumni meetings. Frank Rhinehart is apparently definitely on the confirmed bachelor list and "equipped with an 18–8 shell and a one-inch corrosion allowance." The quotes indicate that Ferguson is doing the talking.

George Onishi, who is with the Studebaker Corporation, advises that he is research laboratory engineer involved with design and test in research engineering and particularly concerned with the motor and chassis division. George is married and lives at 1217 Campeau Street, South Bend, Ind. He also reports that he meets Bob Wallace once in a long while and that Bob is with Marmon-Herrington, makers of all-wheel-drive truck tractors. Bob is chief engineer and is located at Indianapolis. George talked with Sid Badger a year ago. Sid is with Haynes Stellite Company, makers of Stellite tool steel, and is located at Kokomo, Ind. Gordon McNeil drops in to see George about Goodyear fan belts occasionally.

Bob Bonnar has just written that the next meeting of the New York group will be held at the Technology Club on East 39th Street on Friday night, April 25. We know that we will have a good turnout of regulars, and hope that many of you others who have not been able to come before will make it a point to be with us this time. We know you will come back again.

Attention is called to a change in address of your Secretary, who is now trying to be of substantial assistance in the sale and distribution of Boots self-locking nuts to the aviation, automotive, radio, and other fields of application. The New York office address is temporary until he moves to the home office in Connecticut. — RAYMOND F. HIBBERT, *General Secretary*, care of Boots Aircraft Nut Corporation, 247 Park Avenue, New York, N.Y., DWIGHT C. ARNOLD, *Assistant Secretary*, Arnold-Copeland Company, Inc., 222 Summer Street, Boston, Mass.

1931

By now most of you have pretty well made up your minds about attending the ten-year reunion and have advised us accordingly. For those of you who have not, may we remind you that time is short and we must know approximately how many are definitely coming in order to complete the plans. Incidentally, those who cannot attend deserve our heartfelt sympathy in their loss, as to miss the '31 ten-year reunion is a major calamity. There will never be another, so jump aboard while there is still time.

Obie Denison, '11 Secretary and general pepper-upper, has sent in some information on Richard Snow from Worcester. Snow, former assistant superintendent of open hearths at the south works of the American Steel and Wire Company, has been appointed division metallurgist with headquarters at Cleveland, Ohio. He joined the wire company in 1933, became a mechanic, and held other jobs before his appointment as assistant superintendent of open hearths and hot rolling in 1939. — I was talking to Bob Knight recently. He is superintendent of the spring mill of the American Steel and Wire Company's south works in Worcester. Bob is figuring on being on hand for the reunion.

Ed Abbott, who is now located in Chicago with Sears, Roebuck and Company, writes as follows: "Quite a few of the boys are here. Bun Stott, Bryce Spruill, and Don Gilman '32 are all with Sears. Bob Wilson is doing a splendid job managing our New Bedford, Mass., store. Shel Smith is with us in Philadelphia. — We hope to have a good turnout for the reunion. Stott is definitely planning to go. Spruill and I are also going to make every effort to get there — possibly with our families. I am married, as you probably know, and have a daughter four-and-a-half years old. At the next Technology Club meeting here I'll start talking with more of the boys about going back." — Eddie has advanced to the position of factory personnel manager with Sears. He was in Boston late in February to interview Technology men for jobs.

Our congratulations to Gene Branca on his recent engagement to Katherine J. Barry of Hyde Park, Mass. Gene is teaching school in Boston. I saw him with Martin Feeney at a recent club meeting, and both are to be present for the reunion. We'll be seein' ya soon, fellers. — BENJAMIN W. STEVERMAN, *General Secretary*, 14 Russell Street, Atlantic, Mass.

1932

Carroll Wilson, our Assistant Secretary and Alumni Fund Agent, was pictured in the New York *Times* of Sunday, February 16. There we learn that he sailed for Lisbon and thence to London with Dr. Conant of Harvard as part of the work he is doing for the National Defense Research Committee headed by Vannevar Bush '16. One of the duties of this committee is to "correlate and support scientific research on the mechanisms and devices of warfare." In line with this work they will exchange scientific information of vital interest to the two nations.

From recent change of address notices we observe the increasing inroads the military is making on our Class. Edward Allee, XVI, is a captain at Scott Field, Ill. Frank Cook, XVI, also a captain, is with the United States Army Air Corps, Wright Field, Dayton, Ohio. Frederick Eimert, VI-A, is a lieutenant at the Ordnance Training Center, Aberdeen Proving Ground, Maryland. Arthur LaCaperia, II, of 98 North Margin Street, Boston, is on active duty with the Army. Robert Minter is a lieutenant commander at the Naval Air Station, Norfolk, Va., while George Murphy, I, is a lieutenant at Fort Hancock, N.J. Arthur Seiler, XV, is living at the Penn Athletic Club in Philadelphia. As "lieutenant" has been added to his name, we assume that he is in the military service now. Charles Thayer has moved from Evanston, Ill., to 7603 Eastern Avenue, Takoma Park, Md., and is commuting to Washington, D.C. The information that he is with the Army comes from Don Gilman. The first of February we had dinner and a full evening of conversation in Chicago. He is still at Sears, Roebuck and Company and gets to the meetings of the Technology Club of Chicago quite regularly. One of the subjects we talked about was our tenth reunion a year from this June. We both feel that because of the unsettled times it will not be feasible to make our plans as early as we otherwise would. Any letters on this subject, in which you offer constructive suggestions or air your pet peeves, will be appreciated. — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. CARROLL L. WILSON, *Assistant Secretary*, Research Corporation, 137 Newbury Street, Boston, Mass.

1935

Hello folks. Another short news report is on the air. Dick and Mrs. Shaw are now the proud father and mother of a son, Jonathon Lasse, II. Dick is still holding down a desk at the Hartford Machine Screw Company, working on time study and production control. Art Zich and Doris Rosenberg are engaged. Art is with the Quality Paper Box Company in Boston and is superintendent of production and purchasing.

We have some more military news this month. Latest addition to the Army is Art Deming. Quite a number of the Class are now in the Army. — Ed Collins has returned to Roxbury, Mass., having been in Cleveland for some time. I wonder what the old politician is doing now.

Bart Chapman wrote a very amusing letter to Dick Lawrence, who passed it along: "Things have been happening to me thick and fast lately, so I figured I'd make a report. Last fall Uncle Sam asked Remington to build a couple of bullet mills for him — just little shops — on sites measured in miles, and productions measured in the millions; two-by-four plants in which the watchmen will make the rounds by stratoliner, and the boss will call his secretary long distance. Well, someone thought there was just room, perhaps, by squeezing and by parting my hair in the middle, for me. So Jeanette and I broke camp in Ohio, cached our gear in the nearest hollow log, and I reported at the council ring in Bridgeport. There they were planning the campaign. One expedition headed for Missouri and the other for Colorado. Which one I join remains a question. In the meantime I've spent the best part of two moons down here in Penn's Woods (Pennsylvania on recent charts), where Uncle Sam has a bit of a high-speed arrow-head factory by the banks

1935 Continued

of the Delaware — Frankford Arsenal by name. There we're hobnobbing with braves of another tribe, our recent arch-enemy, the Western Cartridge Company. Western is to build a third bullet mill, which won't look much like a phone booth either. Together we're figuring what we'll need in these mill camps and preying on unsuspecting settlers to get it day before yesterday. Uncle Sam provides the wampum and helps us round up the settlers. They all seem anxious to oblige, and we are getting organized quite handily. The reason for all the excitement is that some head Indian named Adolf, over across the pond, has his tribe on the war-path and is making things pretty hot for Uncle Sam's buddy, John Bull. Uncle wants to help John out and says if we give him plenty of bows, arrows, magic carpets, and whatnot, John can give Adolph a run for his money. Whew — after that you'll think I need my head examined, but, if nothing else, it's a relief to poke a little good-natured fun at what I'm doing morning, noon, and night just now. My work on machinery and equipment procurement is as interesting as the devil, and I enjoy it very much. Jeanette is practically a defense widow but is a good sport about it. By summer we may be near Kansas City, or Denver, or maybe I'll be doing 'squads right' in the Army." Many thanks to Bart for the interesting letter. Guess you are just a bit behind the times on one point, Bart. The "squads right" is out in the modern Army.

It is probable that a large number of the Class are as busy as Bart these days. Your Secretary has been putting in upward of eighty hours a week, and the end is nowhere in sight. This business of industrial engineering, methods improvement, and time study is darned interesting, but a tough, nerve-racking business. The results are well worth the effort though — a 65 per cent increase in production with a 30 per cent drop in costs in a period of two months is not too bad for a department. By the time this news column reaches you, a second department should be finished and on standards with a corresponding improvement in production and costs. When life becomes dull, I can heartily recommend industrial engineering — it keeps one on one's toes. — ROBERT J. GRANBERG, *General Secretary*, care of W. C. Voss, 9 Old Town Road, Wellesley Farms, Mass. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road, North, Chestnut Hill, Mass.

1936

One disadvantage of this class-notes column is that the notes must be written about a month and a half before they appear in print. For example, here I am trying to write about our plans for the fifth-year reunion next June and I myself don't know the plans yet. But by the time this is read our reunion committee will have completed their plans, and all of the readers will have more details than I have now. So I will content myself with reminding you that our reunion will be held on June 7 and 8. Reserve those dates. — A group of our Class around Boston met on February 10 and formed the reunion committee which is making the plans. Included in the group are Doug Cairns, Ben Cooperstein, Harry Essley, Martin Gilman, Frank Parker, Carl Peterson, Bob Sawyer, Fletch Thornton, and Norm White. The committee also includes the following members who are not located near Boston: Jack Austin, Hank Cargen, Tony Hittl, and Al Horton. I can assure you that this group is working to make our reunion just the kind of a successful affair that we all want it to be. I understand that quiz cards are to be sent to members of the Class to determine the majority opinion on various details of the reunion.

From our advertising manager, Hank Cargen, I have received the following advertising material, which is too professional to go to waste: ". . . The reunion will be informal, just a get-together to renew old friendships and spend a relaxing week end. There will be no rules, no speeches, no fund raising, and as nearly as possible, no cost. (Per person charge for the week end will be as cheap as living at home.) A retreat in a location determined by the vote of the Class will be chosen to provide a perfect setting for a low-cost, week-end vacation replete with good fellowship, good food, good sports, good beer — all the ingredients of a good time. Complete information will be mailed to everyone within a few weeks and will be published in future issues of these class notes. Meanwhile, make a note of the date — the week end of June 7 and 8 — and plan accordingly. Here is a word of warning to those who know definitely at this time that they'll be on deck. Reservations will be filled on a first-come-first-served basis, with a definite upper limit determined by the location selected. Act promptly when you receive your reservation card."

A letter from Al Horton confirms the news of his marriage on February 25, as given in last month's notes. Concerning his present work Al writes: "It started last August 5, when I got a message that drafted me, in the course of five days, into the common cause of national defense. Since then I've been in the midst of the engineering defense training program, first as a specialist in engineering education, next as administrative assistant to the director, and now, assistant director. How long it will last I wish I knew, for I certainly have a great yen to get back to San Francisco and the Standard Oil of California. It's a great combination, and as far as I'm concerned I'll never find one better."

Another Course XV marriage is to be announced. On January 24 Elizabeth Ellen Shalett became the bride of Paul Morgan in New York City. Mrs. Morgan was graduated from Hollins College, Hollins, Va. — Alden Anderson, XIII-C, was also recently married. His bride is the former Mary Jane Livingston of Marblehead, Mass., a graduate of Wheaton College and a former student of the Katherine Gibbs School. At the wedding on January 4, Frank Mather '37, XIII, was one of the ushers. — Our only engagement announcement this month is that of Domia Parker Lee to Roger Huston, XV. — Just as the rest of the country is entering upon an intensive defense program, so are the builders of Course XVII. With Arthur Carota leading the way with his call to the 245th Coast Artillery at Fort Hancock, N.J., and with Norman White slated to begin active duty in construction work for the Engineer Corps, it seems natural to wonder about the rest of the young officers in our group. It is rumored that John Viola and Dick Hickman may soon be in khaki. Frank Schoettler is as silent about his activities as usual but contributed a very artistic Christmas card. Butch Mullen returned to Cambridge last summer, with Dick Halloran, to gather some education at Uncle Sam's expense by taking the ten-week course in aeronautical engineering. Butch is now swimming in the balmy waters of the Pacific when not working overtime for the Lockheed Aircraft Corporation at Glendale, Calif.

Bob Leventhal is enjoying his work of selling and designing ornamental-glass store fronts. Next time you '36 men stroll down Tremont Street you will pass some of his creations. Saul Lukofsky must still be with the Carnegie-Illinois Steel Corporation in Dravosburg, Pa., as he has not changed his address. If he would only write as volubly as he used to discuss Thorstein Veblen, we might have a lot more news. Angelo Tremaglio is post-officing at St. Marys, Pa. Don't get the wrong idea; he *builds* them.

After an intensive letter-writing campaign to start soon, it is hoped that the more reticent Course XVII members will be smoked out of their seclusion and give us the low-down on their hobbies and their work. — ANTON E. HITTL, *General Secretary*, 109 Shepard Avenue, Kenmore, N.Y. ROBERT E. SAWYER, *Assistant Secretary*, 55 Robinwood Avenue, Jamaica Plain, Mass.

1937

Well, I guess the effort you fellows put forward in writing during January was too much for you. Fortunately, I saved one item from the University of Michigan where Loring C. Farwell is . . . What was that? You want to tell it? Right! "For the sake of the record (non-political), I guess it's about time I tossed off a chronicle of my comings and goings. I seem to be among the unfortunates who seldom see any of the fellows around. Oh, to be sure, I've managed to get east every summer, and I inevitably run into a bunch of the boys. When I get to New York, too, I see the fellows, but all in all my work and moving about haven't been particularly fruitful. There's one exception. I've seen quite a bit of Jim Newman in Chicago. He and his wife are nicely set up in an apartment on the south side. I think the address is 3975 Ellis Avenue. The latest addition to their family is a four-months-old great Dane bearing the name of Portia. Jim, from all I can gather, is going to town at the Ingersoll Steel and Disc Company, and his wife is a mighty swell person.

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"In other respects, however, I've been treading my own path. I stepped into a job with an investment counseling firm after leaving the Institute. Officially, I believe, I was promoted to the position of junior statistician-chartographer after a half a year of picking up mail and emptying wastebaskets. I stayed with the job from September, 1937, to June, 1939, while I was doing some work in the night division of the School of Commerce, Northwestern University. After leaving the job, I put in a full year on the Evanston campus and ended up fairly triumphantly with an M.B.A. as of August, 1940. Right at present I'm holding down a job as a research associate in the bureau of business research here at the University of Michigan, a job as staff assistant in the residence halls, and am studying for the preliminaries for a Ph.D. in business administration, specifically, finance.

"During the year just passed I managed to do a little publishing. I seem to recall that somebody, Walt Blake maybe (no, Loring, I fear it was your scribe), suggested that the Class was a trifle remiss. Well, the stuff was dull — but published. There are three articles under the general title of 'A Review of Railroad Financing, 1920–1938' in the *Journal of Land and Public Utility Economics* of May, August, and November. The first two were written in collaboration with Herbert E. Dougall, a professor at Northwestern, but I am quite willing to accept all praise and shrug off the blame for the third and final job."

I have asked Walt Blake to represent you fellows who are now on active duty or those of you who passed up the chance at the Institute and are now snagged in the draft. It seems that the Army would rather have me where I am than almost anywhere else at present. I was ordered for active duty starting February 1, but then the next thing I knew I had been transferred to what is called the War Department Reserve Pool, which, of all things, is for "key men in industry," to use their own words. So now I'm a key man. I still don't know what it is, but I do know that the jobs we are doing, you and I, are mighty important. Who knows what will come out of all this mess? There I go getting philosophical at a time like this, when there is more important business to cram down your collective gullet.

Walt, after graciously accepting the responsibility, goes on to tell of some of his doings: "I'm living with Jack Robbins in the home of Aberdeen's mayor and am finding army life quite satisfactory. John Gander is down here, too, attached to the Ordnance Training Center, with the job of training the men euphemistically named selectees. Jack and I are attached directly to the Proving Ground on proof work on arms and ammunition. Jack, John, and I are '37's contribution in its entirety, I believe." So to all of you who are now rallying behind the colors — get in touch with the others who like yourself may be shifted away from old friends. Walt will take care of your queries, I'm sure. His address is: Lieutenant Walter T. Blake, care of F. E. Baker, Aberdeen, Md. — WINTHROP A. JOHNS, *General Secretary*, Route 1, Belle Mead, N.J.

1938

The Class will learn with sorrow of the death of John H. Eakin, XV. John was a lieutenant in the United States Army Air Corps and was stationed at Mitchell Field, Long Island. On February 6 he was killed in a plane accident.

In recent notes we have mentioned the names of several boys who are back at the Institute. Still others include Barny Oldfield, who is an instructor in the Department of Aeronautical Engineering; Don Severance, assistant to the registrar; and Don Holloway and Julius Kovitz, who are teaching fellows in the Department of Chemistry. — Jeanne Kitenplon is doing graduate work in chemistry, and in the same Department, Fred Kolb is finishing his doctor's thesis. Dick DeLong is back at the Institute again from his job with the Corning Glass Works.

Melvin Feins is taking the marine engineering training program now being offered at the Institute as a national defense course. Mel has been connected with both the Charlestown Navy Yard and Watertown Arsenal. Other '38 men working at the Navy Yard include Seymour Gross, Sol Kaufman, and Sam Rudginsky. Still another naval man is Ira Lohman, who spent a big week end in Boston recently before going to Washington on work for the Naval Ordnance Department.

Enver Muratzade writes from California that he is studying for his Ph.D. in hydraulic engineering at California Institute of Technology. Not many '38 men are out that way, he reports, but a ten-day skiing trip to Yosemite didn't sound too monotonous. — On January 6 Johnny Roehrig and Barbara Elizabeth Felton were married in Baltimore. — Tom Oakes, XVII, sends in a swell letter from Montpelier, Vt., where he is now an inspector of mortgage loans in the investment department of the National Life Insurance Company. Tom expects to be traveling all over the country about three months out of the year, but right now he and Marie are sold on the skiing up in them thar hills.

Harry Weese, IV, who was a research assistant for the Bemis Foundation last year and who has since been working in Chicago, has again won a national competition. His newest prize, for his design of furniture for outdoor living, was won in the industrial design competition for home furnishings conducted by the Museum of Modern Art in New York City. — Scott Lyon is serving in the diplomatic corps and finds himself in a very interesting and busy place these days — Lisbon, Portugal. — Nicholas Mihailoff, XVI, was at the Institute recently, interviewing men for Pan American Airways. He reports that Ed Bossange and Bob Robbins are moving right along as flight engineers in the Pacific and Atlantic divisions, respectively.

The Secretaries of '39 have recently been taking some pretty mean cuts at your correspondents and at '38 in general. In the March issue they even called for stronger class defense. Well, they'll probably need it. In fact we have the goods on one of them to the extent that we predict he may wish to call it quits any time now. But don't let this stop you from sending us that blackjack and those brass knuckles. — DALE F. MORGAN, *General Secretary*, 55 Pennsylvania Avenue, Mount Vernon, N.Y. RICHARD MUTHER, *Assistant Secretary*, 180 Elgin Street, Newton Centre, Mass.

1939

To make up for much lost time, not to mention misplaced items for The Review, an attempt will be made to bring our Class up to date in this column.

First, it is with the greatest sorrow that we are forced to announce the resignation of our worthy Assistant Class Secretary, who has been moved out of Boston and will therefore be unable to carry on the class functions there as a member of the graduate body. Morrie has been called away to camp; first reports say Aberdeen, but latest bulletins say work at the Springfield Arsenal, which seems to be final.

Hop, skip, and jump to Eke Smith, II, who wrote: "I'm working for Procter and Gamble Manufacturing Company in Staten Island; no engagements, marriages, nor children; sounds very dull. I hope your plans for a reunion are successful." Baron Sternberg, X, is also with P. and G. on development processing equipment in Cincinnati. He writes: "I'm retaining the undergraduate atmosphere by living at the Delt House at the University of Cincinnati. No impending marriages, not even engagements; still playing the field and keeping in practice with an occasional beer party."

The engagement of Sears Williams, XVI, and Norma Forsythe of Lawrence, Mass., has recently been announced. — There seems to be a division of opinion somewhere; letters come in with either a glowing account of prospective matrimonial ventures or else with an emphatic, most emphatic, "not engaged or married as yet!" Who's in the middle? Pierre? — Johnny Evans and Lillian Grace Borjeson of Everett, Mass., have also announced their engagement.

Johnny Alexander, XVI, writes from Dayton, Ohio, as follows: "I got home for Christmas but didn't move around very much except for some time spent in Boston, along with a wee bit of the folding spent in the same place. Stopped in to see Bob Withington, who came out of his wind tunnel long enough to rehash the aviation industry pretty thoroughly. We have been doing some testing of a two-seater pursuit job, twelve hundred horsepower, and I have been the observer. The pilot does a little stunting on the side, and my throat clogs up a bit, but what a breeze!"

This business of skipping a month once in a while seems to bring in by far the

1939 Continued

best results of anything attempted yet. — Oz Stewart, II, has now been a lieutenant in the regular Army for some time, having taken up his reserve commission with the Coast Artillery Replacement Centre in Fort Eustis, Va.

An entire page of Course XVII notes contains the following résumé: "Bill Chance is with the Austin Company and has been spending his time on layout, purchasing, clerking, and machine installation. His jobs have taken him to Edgewater, N.J., New York City, Bayonne, N.J., and Carlisle, Pa. Phil Epifano has a position with his father as a field engineer and is assistant superintendent on some of the jobs. He writes: 'It's a cold, cruel world, tsk, tsk, but I love it.' Andy Rebori has left Chicago to become a structural designer for Stone and Webster, Inc., in Boston, and is not married as yet. Carl Swanson has been married for about a year. He is now assistant to James Norcross'33 of C. W. Whittier and Brothers, real estate, indulging in engineering, drawing plans, and so on. And, finally, Bill Willard is with the Austin Company and has worked in at least six states in the last nine months. He has just bought a car, which is his latest worry, not to mention being 'practically' engaged. He and Chance built some Esso service stations on the new Pennsylvania superturnpike in the Allegheny Mountains. He is now probably in Tampa, Fla. (how unfortunate), on a job for the Continental Can Company."

On November 28 John Detlefsen, II, married Elinor Gooding of Hanover, N.H., in Christ Church, Hanover. Jack and his wife are now living on Park Boulevard in Baton Rouge, La. Willie Smith, X, is engaged to Constance Eastman Williams of Waban, Mass. The wedding will take place sometime this spring. — Our prex, Will Wingard, has forsaken the oil fields and he and wife Gail are now living at 124 Dartmouth Street, West Newton, Mass. — Lawrence Perkins has joined the ranks (in the Chemical Warfare Procurement division, Boston), as has Bill Brewster, II, who by this time is probably getting well accustomed to life in Aberdeen, Md.

Excerpts from a letter of Burky Kleinhofer, dated November 4 (how's the coherence; think I'll have another), read as follows: "Information is at this point pretty sadly minimized. I have seen E. M. Brown, VI, only once since last spring. He lost his roommate, McCroskey, VI, who up and married, by cracky. Bert Pacini's letter tells that he is getting along nicely teaching radio in the defense program. He's left the Dollar Radio Service and is therefore no longer working for George Dadakis, VI. Patch's big problem has something to do with women. (Whose hasn't?) I couldn't quite understand it, but it seems that he is being disillusioned. As for myself, I resigned from the Electric Service Supplies Company after I had accepted a position with Leeds and Northrup Company in Philadelphia. I have been assigned to the engineering department after having gone through two months of training, at which part of my time was spent with Ed Yetter, VI, in his department."

Hewitt Fletcher, V, married Ann Winter sometime last August. — Pete Bernays, also V, was appointed special research assistant in chemistry at the University of Illinois, to work on the study of lime by means of x-rays. And to quote from a recent letter from Pete: "I now have a fellowship in the applied x-ray division of the chemical department and am working on the problems of lime manufacture. I take my preliminaries in April and get my degree in June, 1942, I hope. The chances are that I will be in the Reserve Officers' Training Corps army camp at Edgewood Arsenal this summer.

"Mel Falkof is still at Minnesota but expects to be called to active duty any time now. Jim Schulman was married on Christmas to Doris, whose last name seems to be elusive, and Basil Gray, when last heard from, was in South Pasadena, Calif., doing research and control work. Last problem he tackled was in the moving picture industry, making smoke which wouldn't bother the actors. Ida Rovno is married, they tell me; the letter bearing the news came from Schulman and had a question mark after the sentence.

"Dick Hanau, VIII, was also married sometime near Christmas, to Laia Pearlmutter of Revere. Dick is living in Ann Arbor, where he is an assistant in the physics department at the University of Michigan. Also during the holiday season, Dick Feynman announced his engagement to Arline Greenbaum. Dick is at Princeton University, holding a fellowship in physics. Leonard Mautner, VI, is married and is working as an inspector in some army work, while Maurie Meyer, VI, is at Dayton, working at Wright Field. That should hold you for a while." It does; thanx, Pete.

And a very nice letter from Mary Kilgore McKinnon does much toward clearing up the Course IV situation. It reads as follows: "There never seems to be much in the class notes about the fellows and girls who were in Course IV, so I think I'll try to fill in the gap — no doubt some of them would like to know where everyone is.

"In the first place, five of us, as far as I know, have been married since graduation — Wendell Jacques, Tommy Akin, Walter Pulsifer, and then I was married on August 3 to Kenneth L. McKinnon, who is now going to the University of California College of Dentistry. I am working in the office of three architects here in San Francisco. About the same time, Benny Krause was married. Ed Brown is engaged to Frances Muther. Anne Alice Person, who has been Mrs. Stanley D. Zemansky'37 for several years, has just announced the birth of a son, Lester, on January 3. The Zemanskys are being transferred to Dallas, Texas, by North American Aviation, Inc., for whom Stan works.

"George Moore had been working in Los Angeles but has returned to San Francisco. Frances Emery is still working in the Boston area. Benny Krause and Bill Haible are working for the Bemis Foundation under John E. Burchard'23. Ed Brown is working in the Chicago office of the Formica Insulation Company. Steve Macdonald has gone back to Salt Lake City to go into business for himself. Pulsifer and Akin are in Boston. Arthur Cook is in Norwood, Mass.

"There are several recent Course IV graduates here in San Francisco besides George Moore and myself. John Kelley, who received his master's degree in '40, has been here since last spring and has been working for William W. Wurster. Lois Goetz and Bob Deshon, who got his master's degree in '40, are both here. Lois is working for Richard Neutra now, and Bob has also been with Wurster.

"The Technology Club has a swell chapter here, and we have had some very interesting meetings. Guess I am the only woman graduate (or was till Lois came back), so I am eliminated from some of the meetings, but the ones I have been to were great. Particularly good was the dinner with President Compton as guest of honor."

From George Beer, deep down in the Rio valley, we have the following: "It's about time I made an official report to the Class to confirm any vague rumors that may be extant. I haven't seen a Review for six months, so I don't know whether any news about me has broken into print. Anyway, I got my S.M. in October, hurdling all obstacles in reverse, as usual, and took off for Houston and the Shell Oil Company with Mrs. B. (née Joan Chandler of Plymouth and Wellesley collitch) in tow. I spent three months in the lab before they sent me out into the field for a bit of practical experience behind a Stillson wrench and sledge. My first assignment was to the Gulf coast swamps, where I killed three alligators and a lot of ducks and built innumerable board roads. Then I was sent to the cactus and mesquite country of the Rio valley, where I am now spending most of my time strapped to a derrick ninety feet up, pulling and setting tubing in our wells. So much for the *status quo;* as to the *status futurus*, I am to spend two years as a trainee learning how to drill wells, after which it is to be hoped that I shall attain the cognomen of exploitation engineer.

"I haven't heard from anyone or even seen a Tech man for so long I've forgotten what a Harvard trim looks like, so give my best to the boys. This disgusting state is dry except for beer, but I am doing my patriotic best to keep the breweries off the rocks."

There is more catching up on the way shortly; but meantime, any and all items are more than welcome. — STUART PAIGE, *General Secretary*, Box 207, Greenwich, Conn.

1940

From William G. Osmun, XII, a lieutenant in the Flying School, Montgomery, Ala., I received a very interesting letter: "The national emergency has

Please turn to page I for information on Alumni Day, June 9

1940 Continued

caught me in its toils with a resultant one-hundred-and-eighty-degree shift in my point of view. Instead of looking down at the ground, I am now scanning the sky. In other words, I have landed a job about as far from the field of my M.I.T. studies as anyone could possibly imagine.

"I wonder if the people back at Technology realize how thoroughly the class of '40 of all universities in the United States is being absorbed by our defense program. The number of former acquaintances that I have met since joining the Air Corps has never ceased to amaze me. In addition to a number of fellows from Tech, I have met many people that I have known in other parts of the country and also at the University of Virginia. In the flying cadet class of SE 41-A, I found Butman and Nash, who were both aeronautical engineers in the Graduate School. These men are scheduled to complete their training and be commissioned as second lieutenants in the Air Corps Reserve. Our Class has two representatives in the flying cadet class SE 41-B, namely, Bob Hale and Jay Zeamer. These fellows have been very fortunate in that they have never been separated during the whole course of training, from primary right on through basic and advanced. I have seen them quite often and am glad to say that they are carrying away a good percentage of laurels. It seems that Hale and Zeamer were both cadet officers at primary and also here at basic. In my classes they carried off honors — but then I would have bawled 'em out if they hadn't, for the course that we give here is the kind that an M.I.T. man could pass with flying colors even if he slept through half of the classes."

Bill says this about his own work: "It involves teaching meteorology to flying cadets — men who are training to be pilots in the Air Corps. The story of how I got here is too long winded to be included in a letter, but the point is that I am now completely out of touch with geology and geologists except when I meet some of them who are training to be pilots. — I hope that this bit of military intelligence will be of some use to you, and I assure you that I will forward any information that I can gain about Technology men in the Air Corps."

Hale and Zeamer started their primary training about July 31 last year in Chicago and are taking basic at Maxwell Field, Montgomery, Ala.

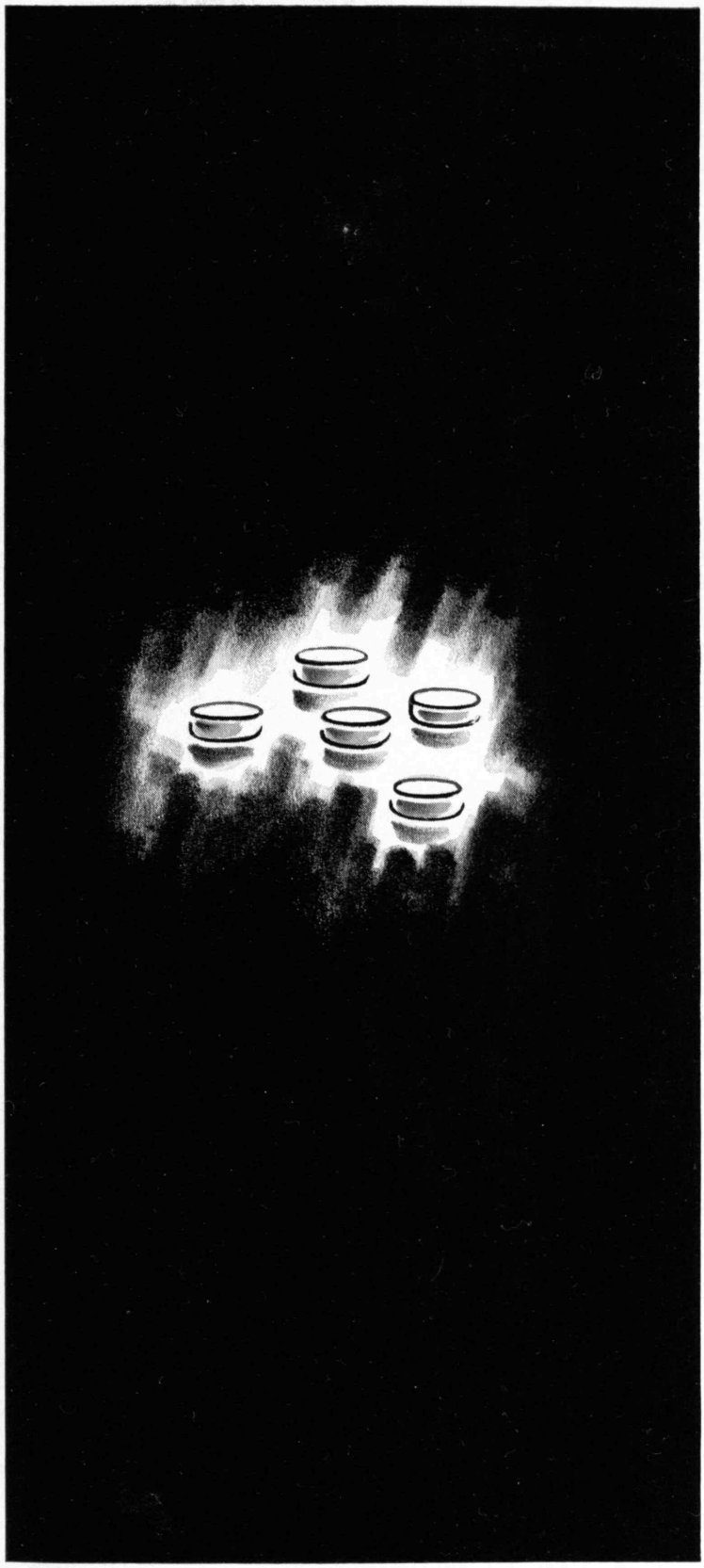
David M. Huber, X, writes that he is with the General Electric Company in the works laboratory in Pittsfield. As he is still a green man, he has found that much of his work has been playing nursemaid to a varnish kettle, turning out some 1,200 gallons of wire enamel a week. However, he expects to be put on wire-testing or plant-research problems very soon.

I was happy to discover that at least one other Technology man was within driving distance. Ed Bernard is located in Richmond, and he says the M.I.T. Club of the Virginia Peninsula luncheons are interesting as there are a couple of '39 men always there, but he hasn't found a '40 man since leaving for the South.

R. E. Gladstone, who was with Condor Solvents for a while, is now plant chemist for the Commonwealth Plastic Company at Leominster, Mass. The company is an injection-molding outfit, making buttons, novelties, and costume jewelry. He is very happy about it and says the opportunities involved are excellent. — Leslie Sutton tells of his interesting work with E. B. Badger and Sons, where he is doing development work in connection with a navy contract. The company designs and builds oil refineries and such equipment. However, defense orders are causing concentration on such jobs as a toluene plant and a T.N.T. plant. — Bob Davis (whose name was Cohen before a legal change) is now happily placed with Shell Oil Company, Inc., in their training course for sales engineers. — Crosby writes: "I have no kicks coming, considering the boners I pull. I am working in a steady, nondefense industry, which has considerable attractiveness for that very reason."

Mr. and Mrs. John J. Leu of White Plains, N.Y., formerly of Wellesley Hills, Mass., have announced the engagement of their daughter, Dorothy Elizabeth, to F. Kimball Loomis, who has been associated with the Weatherhead Company of Cleveland since graduation. — Wedding ceremonies on February 2 united the former Elsie Alma Johnston and Ralph Turner Millet.

In view of the complete absence of news from class members, I serve notice now that you are liable someday to get a column which reads "I" all the way through. — H. GARRETT WRIGHT, *General Secretary*, 324 57th Street, Newport News, Va. DAVID T. MORGENTHALER, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.



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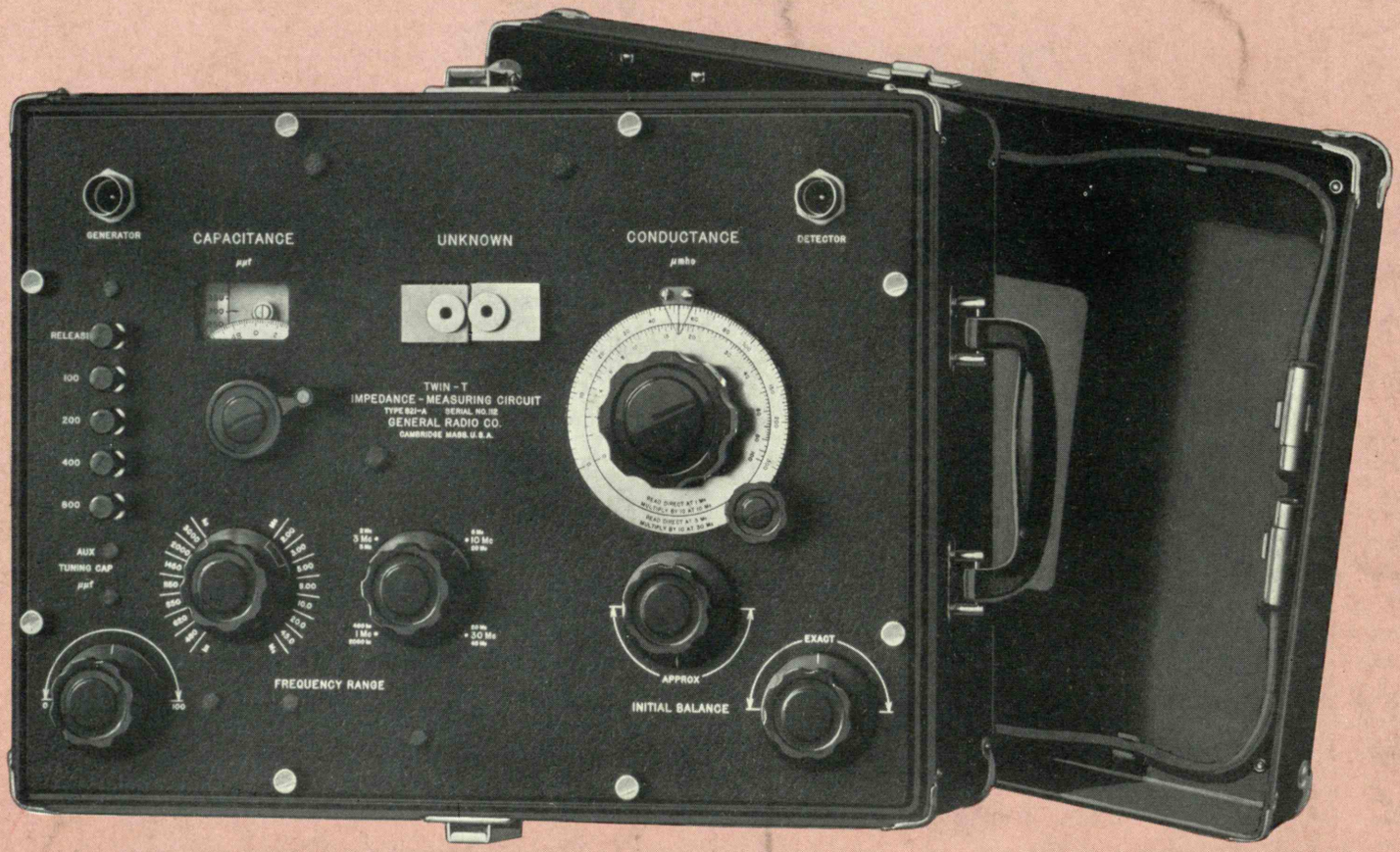

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